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Oki Data CONFIDENTIAL

MICROLINE 320FLATBED PRINTER
Maintenance Manual
(OEL)

[Rev. 3]

Related drawings

Drawing No.	Name
41735401TL	ML320FLATBED(OEL) Disassembly for Maintenance
41735401TR	ML320FLATBED(OEL) RSPL

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PREFACE

This maintenance manual describes field maintenance of the MICROLINE 320FLATBED printer and options for maintenance engineers.

For performance specifications and operating procedures, refer to the "User's Manual".

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1. CONFIGURATION

1.1. Standard Printer Configuration

The standard configuration of the ML320FB is shown below.

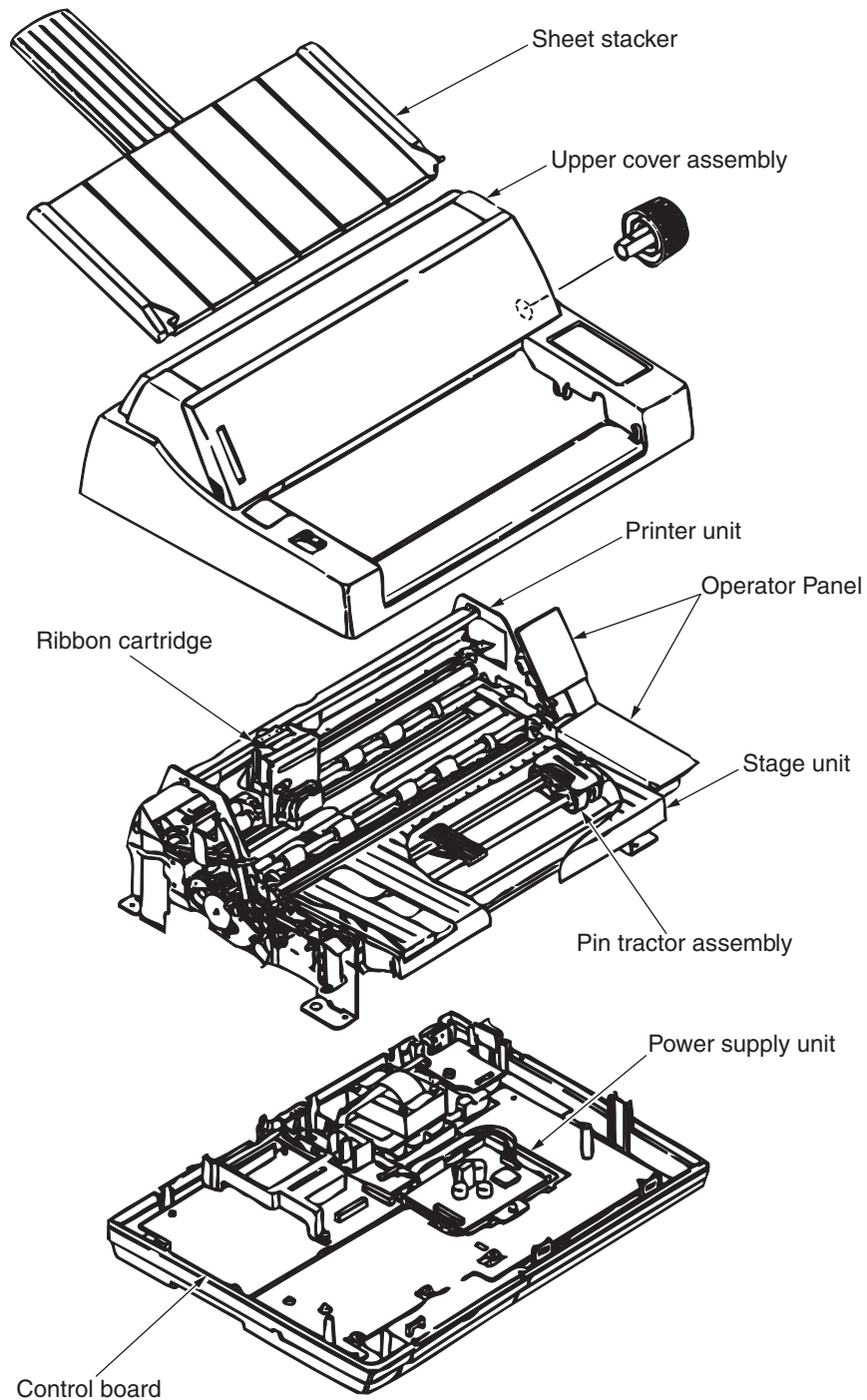
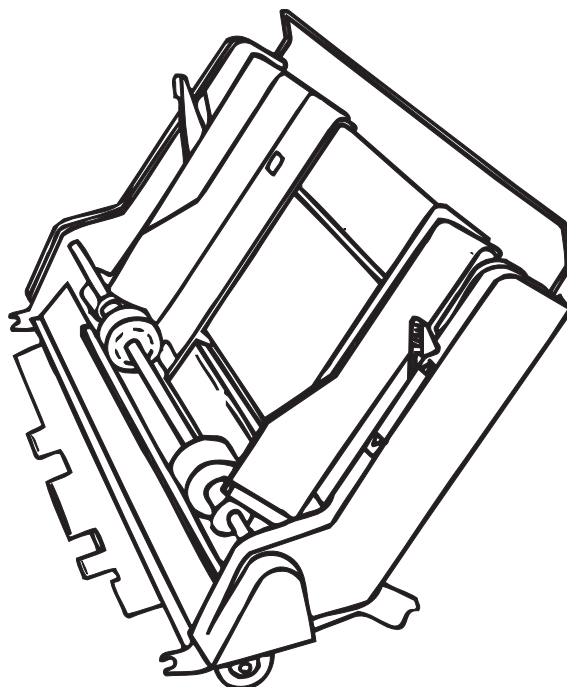


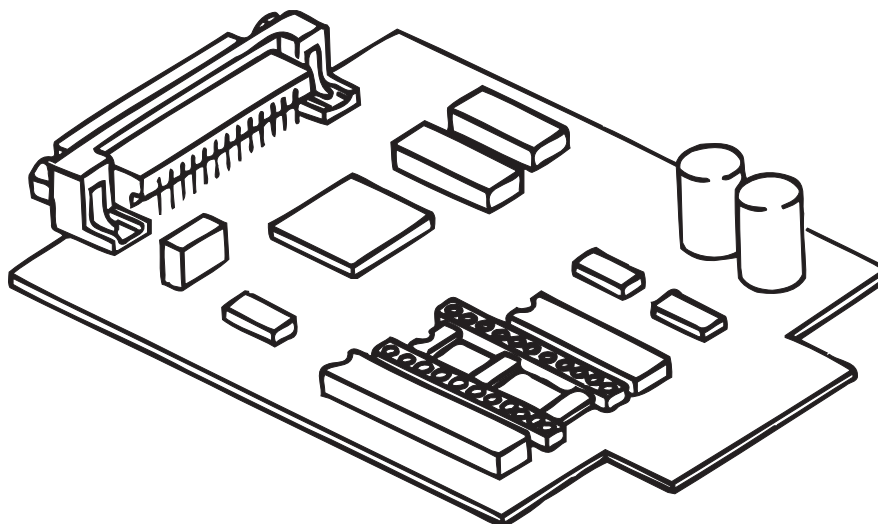
Figure 1-1 Printer Configuration

1.2 Options

(1) Cut-sheet feeder unit



(2) RS-232C serial interface board (Option)



2. THEORY OF OPERATION

2.1 Electrical Operation

This section describes the electrical operation of the printer circuits.

2.1.1 General

The block diagram of the printer circuit is shown in Figure 2-1.

The control board consists of a microprocessor and its peripheral circuits, the drive circuits, sensor and switch detection circuits and interface connectors.

The power to the control board is provided from the power supply board via a connector cord.

The power to all other electrical components is distributed via the connectors in the control board.

2.1.2 Microprocessor and its peripherals circuits.

(1) Microprocessor (05D : 80C154)

The microprocessor is the nucleus of the control circuit. Its peripheral circuits operate under the program control of this microprocessor. The I/O ports of the microprocessor are connected to the address bus, data bus, and control lines.

(2) Program ROM (03B)

The program ROM contains the control program for the printer. The microprocessor operates the printer by executing this control program.

(3) RAM (04C and 04D)

The RAM stores data such as received print data.

(4) LSI (MSM7U042) (04B)

The MSM7U042 is an external interface and motor control LSI. It has the following functions:

A : External interface controller

(a) Parallel interface function

IFD1 to IFD8 are used as an input port; the parallel data received through the interface connector is latched in synchronization with the strobe signal (\overline{STB}) and is sent to the microprocessor in synchronization with the RD signal. The MSM7U042 also sends \overline{BUSY} , \overline{ACK} , \overline{PE} and \overline{SELECT} signals to the parallel interface connector in synchronization with the WR signal.

B : Motor controller

(b) Spacing speed control function

This function accelerates and decelerates the spacing motor rotation rate in accordance with commands received from the microprocessor, and controls the spacing motor speed in each printing mode.

(c) Dot timing generation function

This function generates the dot-on timing signal (IPT), synchronized with the printing speed in accordance with the output signals (PHASE A, B) of the encoder disk on the spacing motor, and sends this timing information to the microprocessor.

C : D-RAM controller

(d) Executes refresh and read/write of D-RAM (04C, 04D) by \overline{RAS} , \overline{CAS} , and DRAM A0 through A7 signals.

D: Other functions

(e) I/O ports

The MSM7U042 has a 11-bit output port and a 10-bit input port. It sends control signals in accordance with the commands received from the microprocessor.

The input port is also used to read information from the operation panel switches, etc.

(f) Address latch

The address latch latches the low-order 8 bits of the address bus (A0 to A7). These bits are used as an address for read/write operations with peripheral devices. Latching of A0 to A7 is necessary because these 8 bits are also used as the data bus.

(5) CGROM (02B)

The resident character fonts are stored in the character generator.

(6) EEPROM (05B)

This 1k-bit serial data electrically erasable and programmable ROM stores the menu mode data.

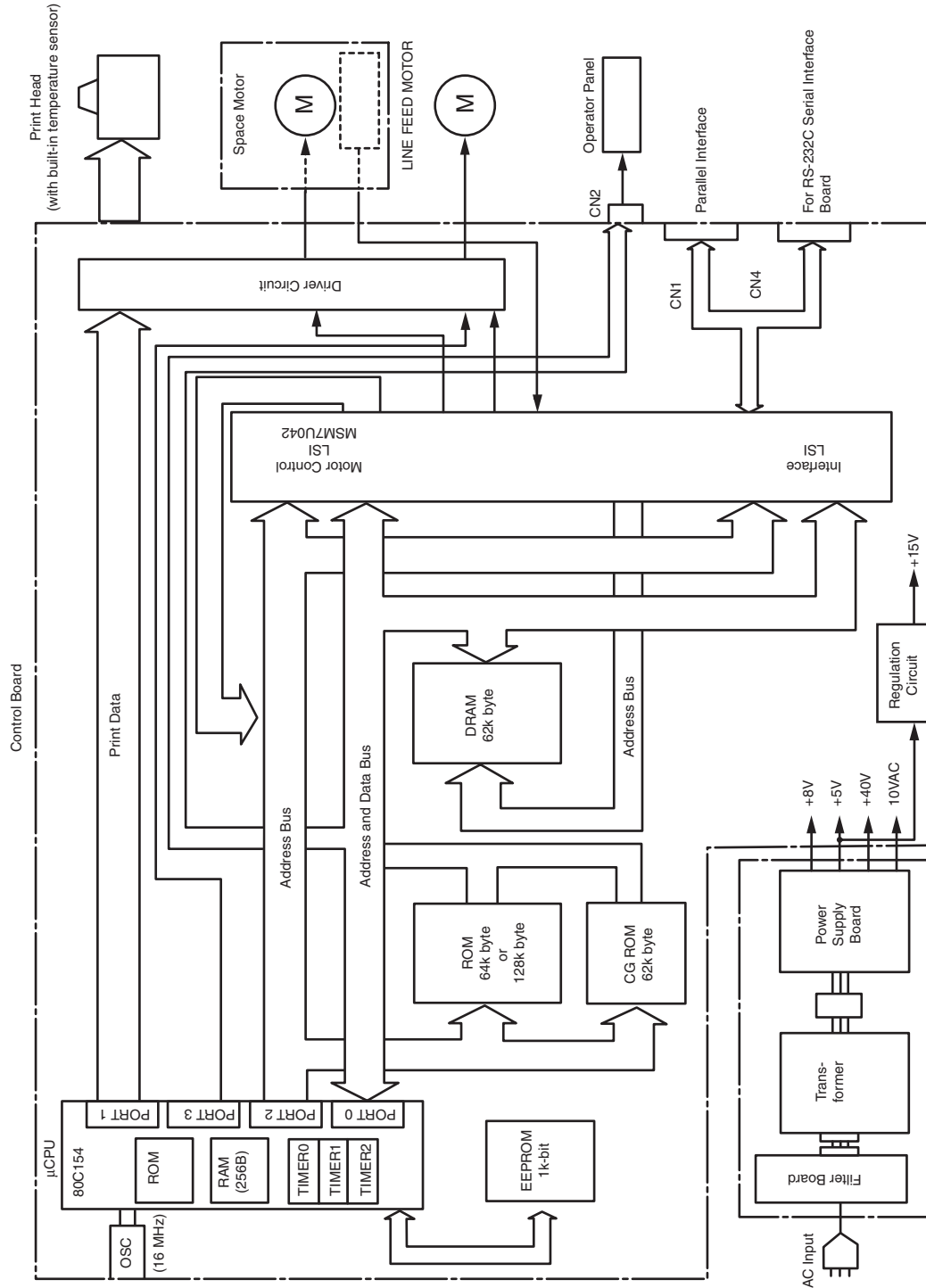


Figure 2-1 Block diagram

2.1.3 Initialization

The printer is initialized when the power is turned on or when the parallel interface signal I-PRIME is received from the host computer.

Initialization is started when the RST OUT signal is sent from the reset circuit (03A pin 1) to 05D and 04B, and SRSTOUT is sent to each device. BUSY signal is active during initialization stage.

When reset is completed, ROM program execution starts with mode setting of 05D and 04B. Then a memory (ROM and RAM) check is performed, RAM is initialized, and the carriage is homed. The program finally establishes the interface signals (output level of ACK signal, BUSY signal, etc.), lights the SELECT indicator, and informs the host computer that the printer is ready for data reception (in the data reception wait state), completing initialization.

2.1.4 Interface control

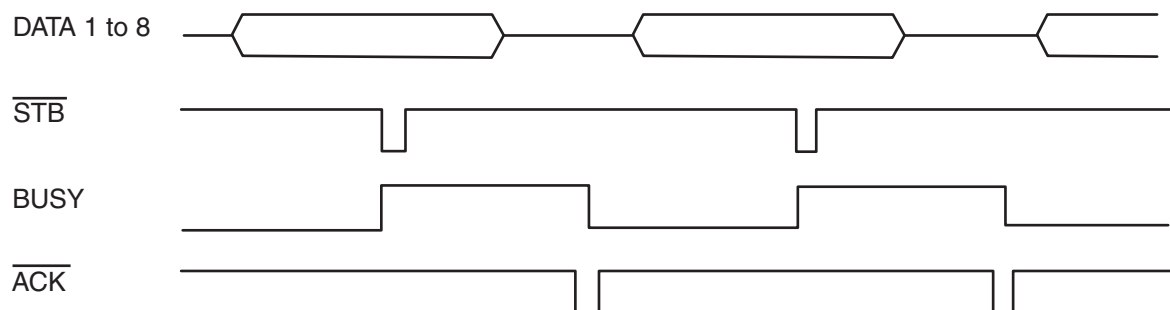
(1) Parallel interface

The data from the interface is input through a connector (CN1), and the interface LSI (04B : MSM7U042) latches this input data in synchronization with the $\overline{\text{STB}}$ signal.

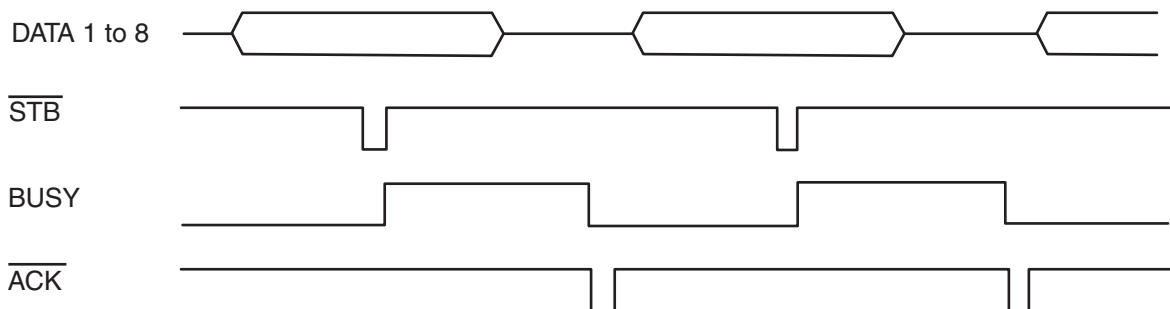
The BUSY signal is on during processing of this data. When the processing is completed, the BUSY signal is turned off, and an $\overline{\text{ACK}}$ signal is sent to request more data.

The BUSY signal is also on when data cannot be received (When the receiving buffer is full, etc.).

(a) Standard



(b) Special

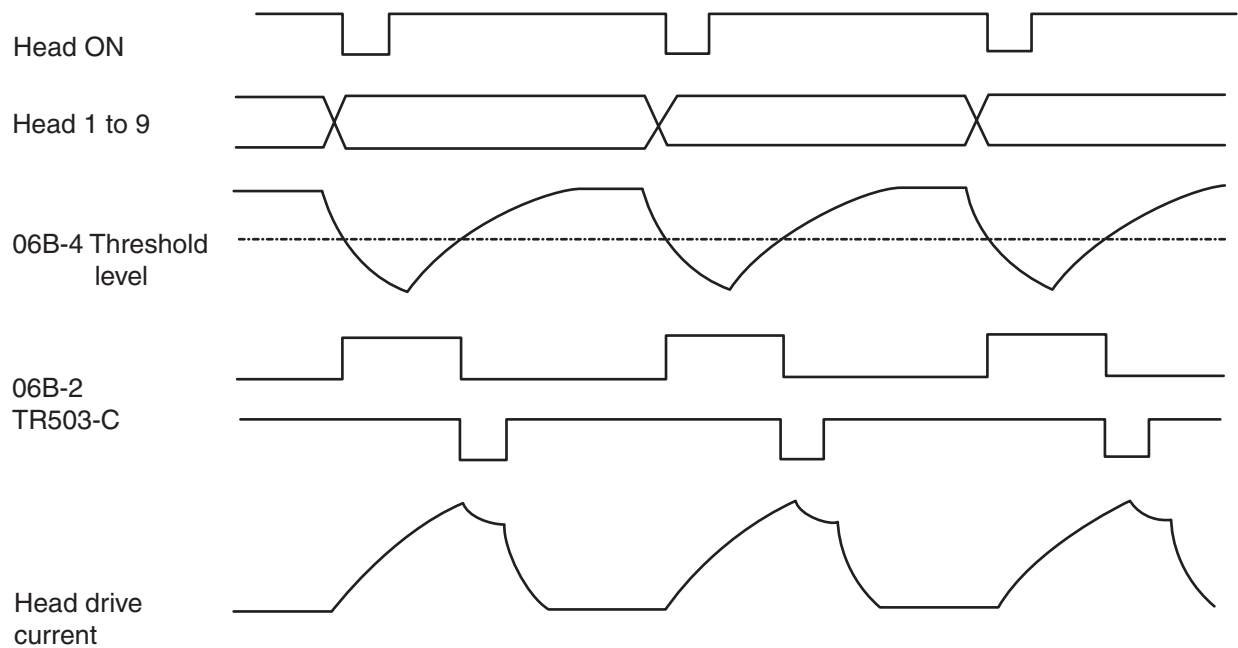


2.1.5 Print head drive circuit

This circuit drives the head magnets corresponding to the HEAD DATA1 to 9 signals in accordance with the HEAD-ON signal, making the print head print characters.

When the HEAD-ON signal goes low, the RC integrator determines the head drive time. This integrator automatically compensates the printing pressure in accordance with the drive voltage (+40V).

That is, the integrator elongates the drive time if the drive voltage falls, and shortens the drive time if the drive voltage rises.



2.1.6 Spacing drive circuit

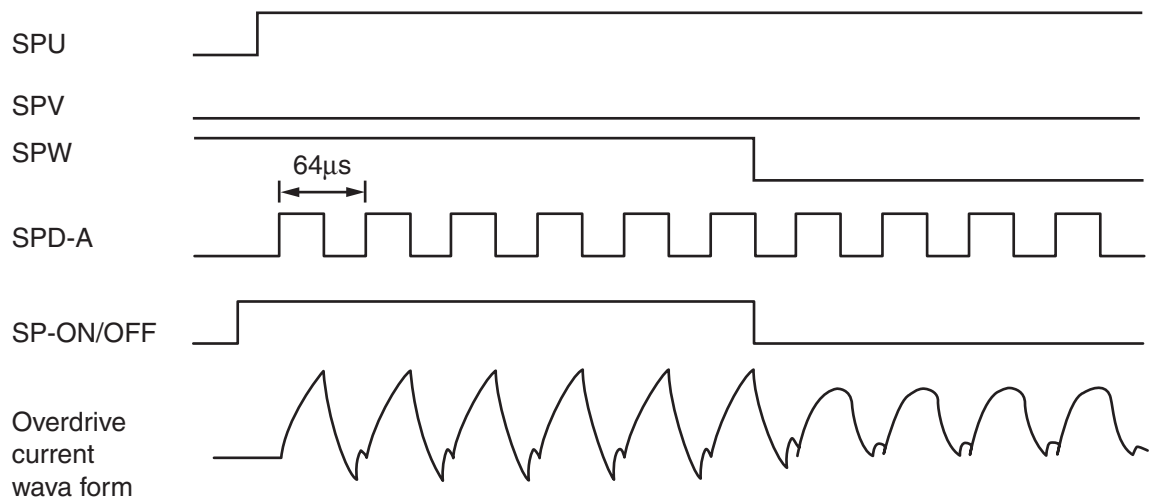
(1) Spacing motor control

The motor control LSI (04B : MSM7U042) outputs the spacing motor phase signals (SPU, SPV, and SPW) in accordance with the spacing command from the microprocessor, and at the same time outputs the overdrive signal (SPD-A).

The SPD-A signal is a fixed-period pulse signal. The pulse width is controllable by the program, and is used to control the motor drive time.

The SP ON/OFF signal is used to control acceleration and deceleration motor torque.

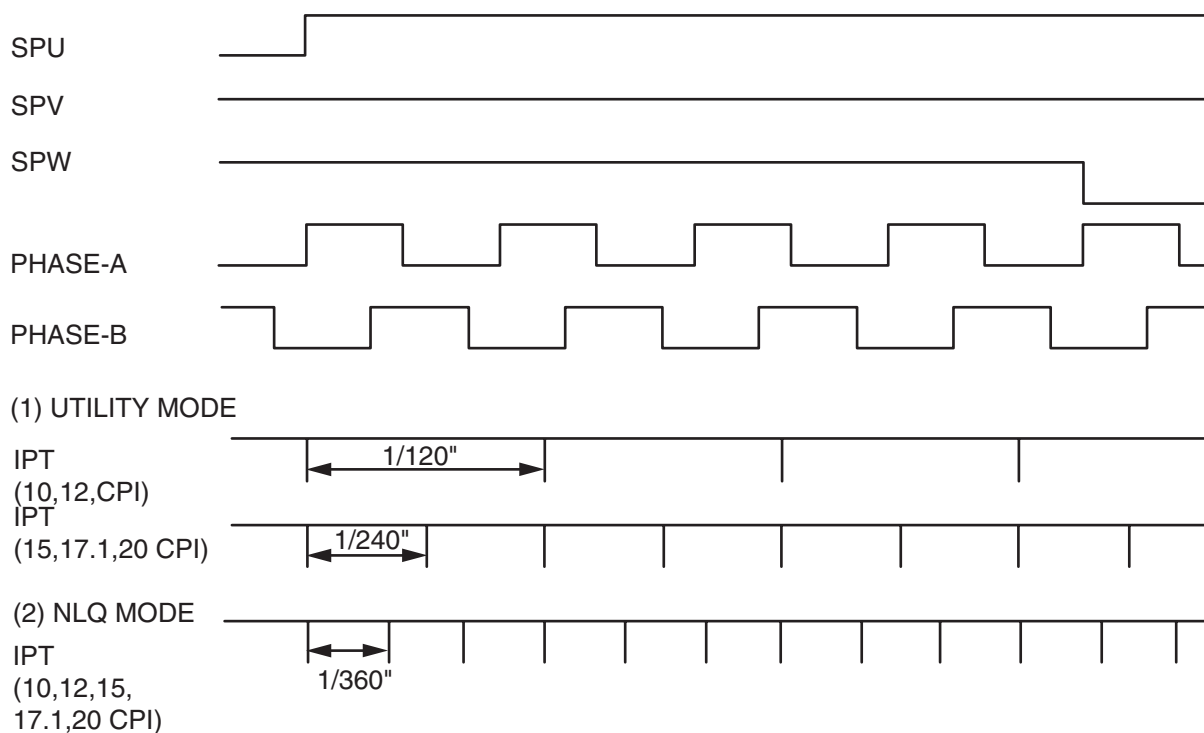
The motor driver (MTDV) drives the spacing motor in accordance with these signals. Pins 19 of the MTDV are for the protection circuits against overcurrent.



(2) Encoder disk

In the operation of the spacing motor, the PHASE-A and PHASE-B signals are generated. when the encoder disk interrupts the photo sensor.

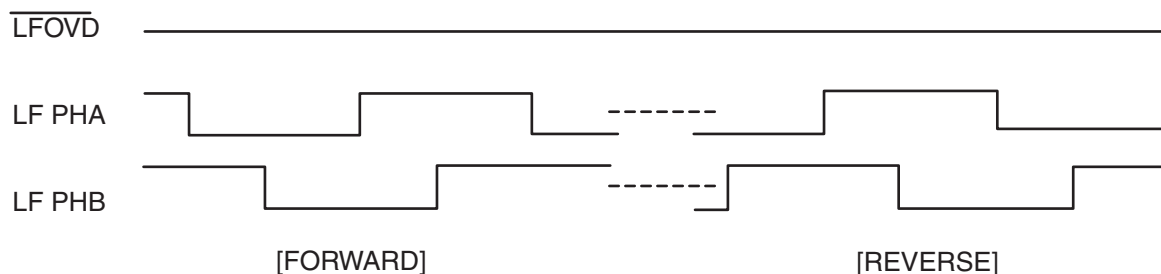
The motor control LSI (04B : MSM7U042) divides the frequencies of these edge pulse signals in accordance with the print pitch, and sends the IPT signal to provide dot-on timing and carriage position detection timing.



2.1.7 Line feed circuit

The line feed motor shaft is held stationary by the LF HOLD signal (holding current : approx. 100 ~ 190 mA) while it is at a stopped position.

During line feed operation, the line feed motor is driven by a large current supplied in accordance with LF OVD signal.



2.1.8 Alarm circuits

(1) Fault alarm circuit (in power supply unit)

This is a protective circuit which causes the AC fuse to open when a fault occurs in the print head drive circuit, space motor drive circuit, or their peripheral circuits, thus preventing component failure.

For this purpose, this circuit monitors the drive time using the HDALM signals interlocked with the overdrive signal of each drive circuit. If the drive time of any drive circuit exceeds the specified time, the drive circuit fault alarm circuit sends an ALM signal (high) to turn on the SCR (on the PSU).

This causes the secondary coil (40 V) of the transformer to be short-circuited, resulting in flow of overcurrent through the primary coil, causing the AC fuse to open.

(2) Print head overheat alarm circuit

In order to protect the head coils, this circuit monitors the head temperature using the built-in print head thermistor.

If heavy-duty printing is performed continuously for a long time, the print head temperature rises. When the head temperature reaches a certain value (about 100°C), a head overheat alarm is detected.

When the alarm is detected, the printing operation is halted to wait for the head temperature to fall. When the head temperature returns to a point below the alarm detection temperature, the printing operation is restarted.

The alarm detection is performed as follows:

When the temperature in the print head rises, the resistance of the thermistor falls and the potential of the comparator (06B) negative input falls to invert the comparator output, thus causing the HEAD TEMP signal to be sent to the motor control LSI.

2.1.9 Paper end detection circuit

When no paper is installed or an end of paper condition exists, the photo-sensor (PE) on the sensor board is turned off, changing the PAPER END signal to a low level. This signal is fed to pin 60 of the motor control LSI (04B), which causes the printing operation to halt and the ALARM indicator to illuminate.

2.1.10 Power supply

The power supply consists of a power transformer, filter board, and DC power supply board. The input AC voltage is transformed into 8.6 VAC, 46 VAC and 10 VAC by the power transformer.

These AC voltages are rectified to + 8 VDC, + 5 VDC, and + 40 VDC levels by the DC power supply board and supplied to the control board.

(1) Filter board

The filter board consists of the power switch, AC fuse and AC noise filter.

(2) Power transformer

If the internal temperature of the power transformer rises abnormally, the built-in thermal fuse opens to prevent any damage to other electrical components.

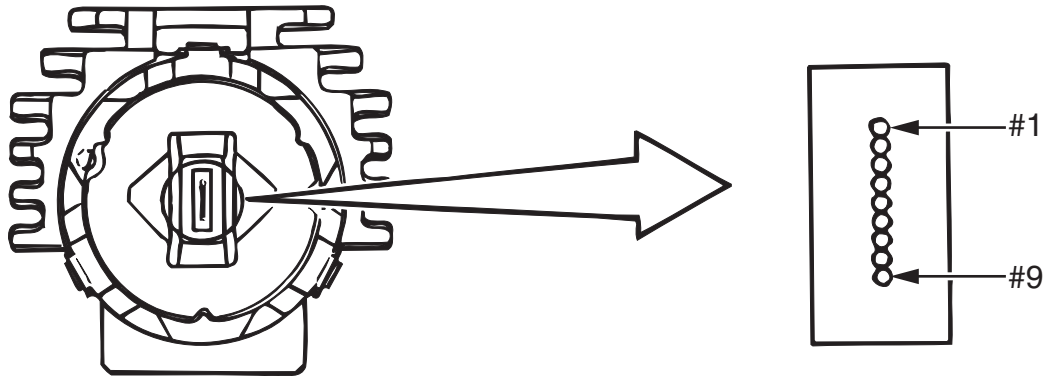
(3) Power supply board

Rectifies the AC voltage input to + 8 VDC, + 5 VDC and + 40 VDC and supplies them to the control board.

2.2 Mechanical Operation

2.2.1 Print head mechanism and operation (See Figure 2-3.)

The print head is a spring charged type 9-pin driving head utilizing a permanent magnet. It is attached to the carriage and moves in parallel with the platen. Electrically, this unit is connected to the control circuits through the control board.



**Figure 2-2 Arrangement of the head pins
(View from the tip of the print head)**

(1) The print head is composed of the following parts:

- (a) Wire guide
- (b) Print wires
- (c) Armature assembly
- (d) Yoke
- (e) Spring
- (f) Spacer
- (g) Magnet assembly
- (h) Thermistor
- (i) Printed circuit board

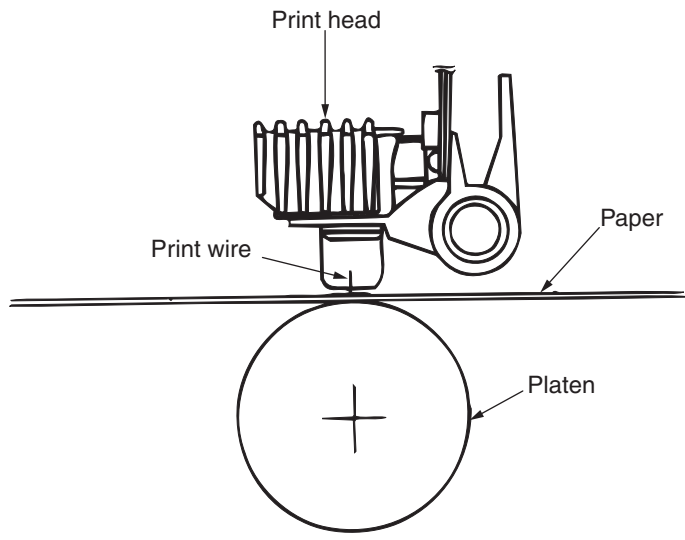
(2) Operation of print head (See Figure 2-3.)

When the print head is idle, the armature is attracted by the permanent magnet and the spring fixing the armature is compressed. The print wires fixed to each armature are thus concealed under the wire guide.

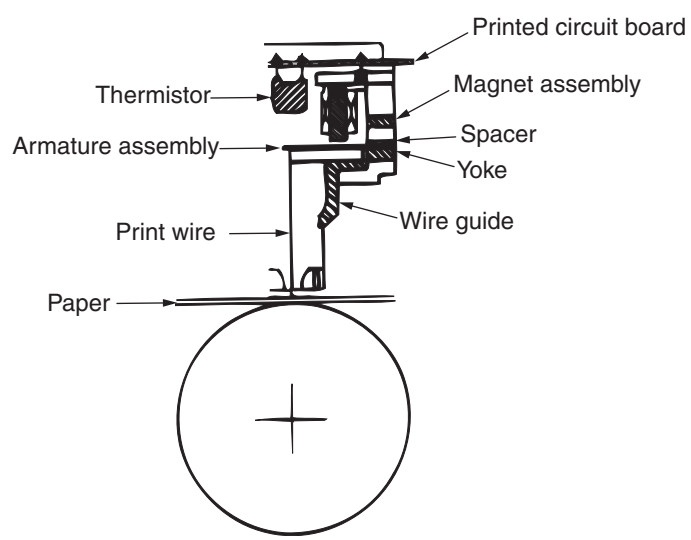
When a signal for a character to be printed is detected, current flows through the coil. When the coil is activated, the magnetic flux (caused by the permanent magnet between the armature and the poles) is canceled to eliminate the attraction force. The armature is driven in the direction of the platen by the force of the armature spring. The print wire fixed to the armature protrudes from the tip of the wire guide, strikes the paper through the ribbon and prints a dot on the paper.

When a character is printed, the armature is magnetically attracted again and the print wires are again concealed under the wire guide.

A thermistor in the print head prevents burning caused by over-heating of the coil during extended continuous bi-directional printing. When the temperature of the coil exceeds a predetermined limit (about 110°C), the control circuit detects a thermistor signal. Printing then becomes intermittent or stops completely until the coil temperature falls below the limit value.



(1) When printing



(2) When not printing

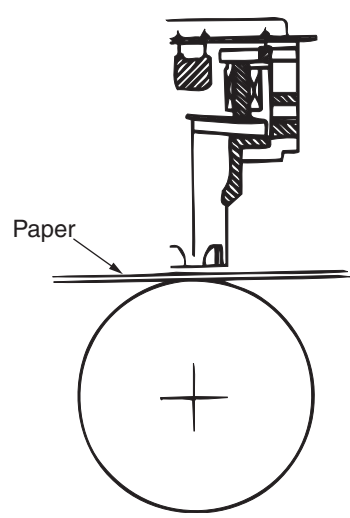


Figure 2-3

2.2.2 Spacing (See Figure 2-4.)

The spacing mechanism consists of a carriage shaft which is mounted in parallel with the platen, and a carriage frame which slides over the shaft. A DC motor which is mounted on the bottom surface of the carriage frame is used to move the carriage frame. The spacing mechanism consists of the following items:

- (a) DC motor with gear (motor PC board included)
- (b) Carriage frame
- (c) Carriage shaft
- (d) Space rack
- (e) Encoder sensor
- (f) Encoder disk

(1) Spacing operation

The carriage frame, which is connected to the print head and space motor, slides over the carriage shaft in parallel with the platen. When the space motor turns in clockwise direction, the motor gear rotates against the space rack, moving the carriage from left to right.

For every complete turn of the DC motor, the carriage frame moves 0.8 inch (20.32mm).

The encoder disk rotates together with the motor, interrupting the encoder sensor. The position of the carriage frame can be determined by counting the number of times the encoder sensor has been interrupted.

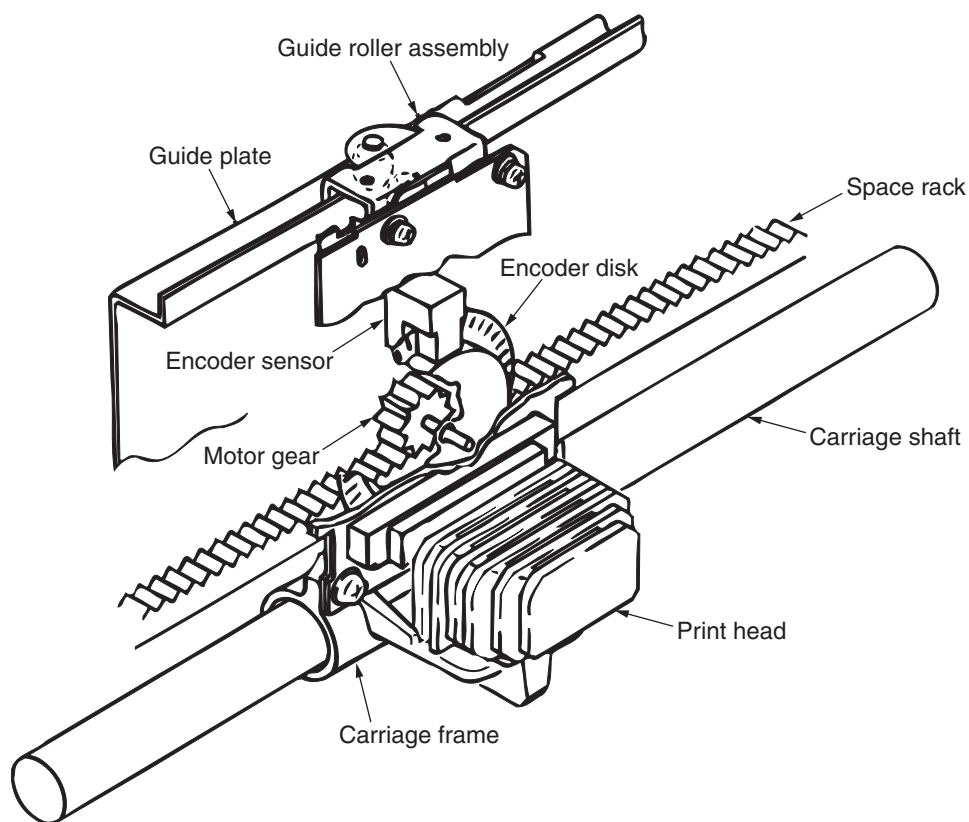


Figure 2-4

2.2.3 Head gap adjusting (See Figure 2-5.)

The head gap adjusting function adjusts the gap between the print head and the platen. Raising or lowering the lever moves the carriage shaft up or down to adjust the gap.

Move the adjust lever. Its carriage shaft rotates. The adjust bushes (L) and (R) restrict the orientation of the eccentric fulcrum of the adjust lever (the part that engages with carriage shaft). So, as the carriage shaft rotates, it is raised or lowered within the side frames. As the carriage shaft is raised or lowered, the print head moves closer to or away from the platen.

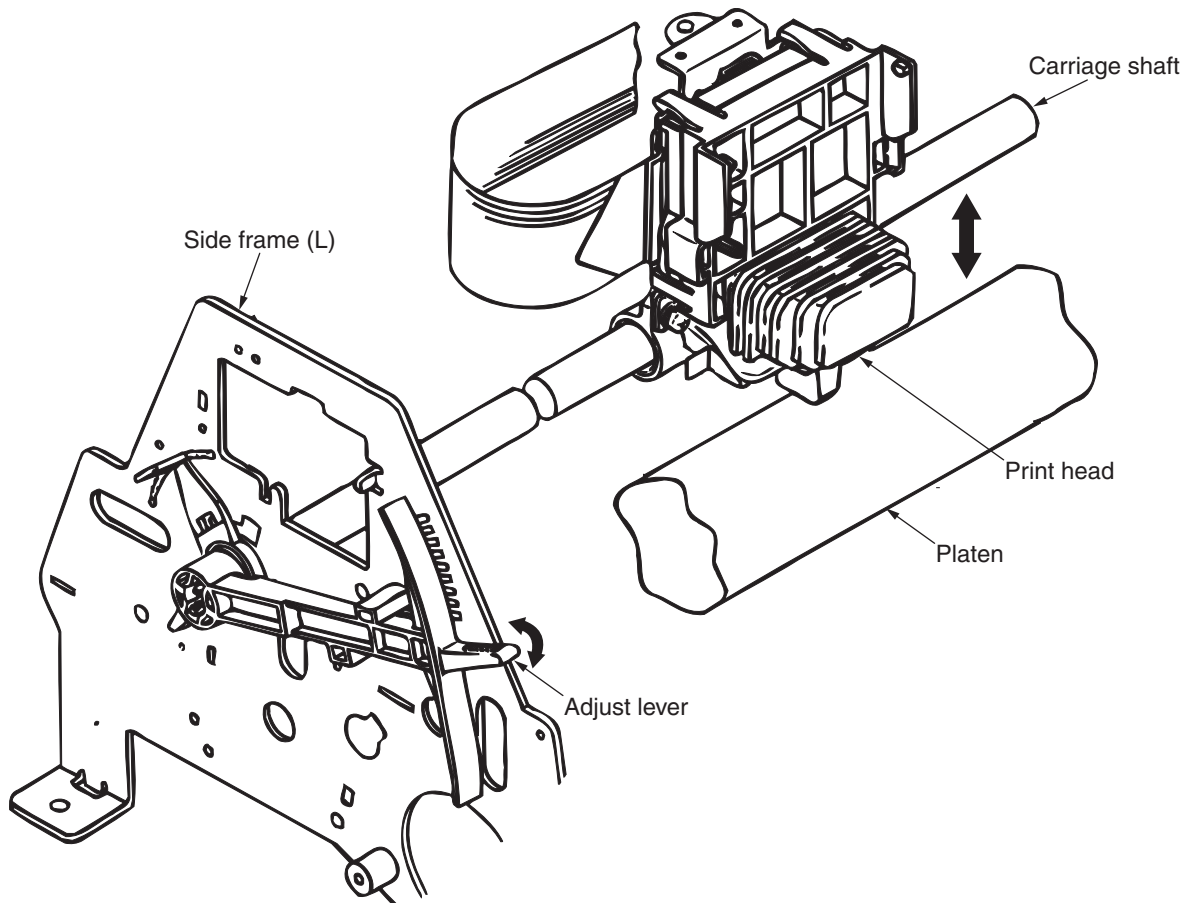


Figure 2-5

2.2.4 Ribbon drive (See Figure 2-6.)

The ribbon drive mechanism moves the ribbon in synchronization with the space motor operation.

The ribbon drive mechanism consists of the following items:

- (a) Ribbon drive gear assembly
- (b) Ribbon gear (space motor)
- (c) Ribbon cartridge

(1) Ribbon cartridge

An endless ribbon with a single direction feed is used. Ink is supplied from an ink tank, which is built into the ribbon cartridge.

(2) Ribbon drive operation

When the space motor is activated, the ribbon gear rotates. The rotation is transmitted via the ribbon drive gear assembly to the drive gear in the ribbon cartridge, thus moving the ribbon.

The feed direction of the ribbon is maintained by switching the rotational direction of the gears in the ribbon drive gear assembly. This ensures ribbon movement when bidirectional printing is used.

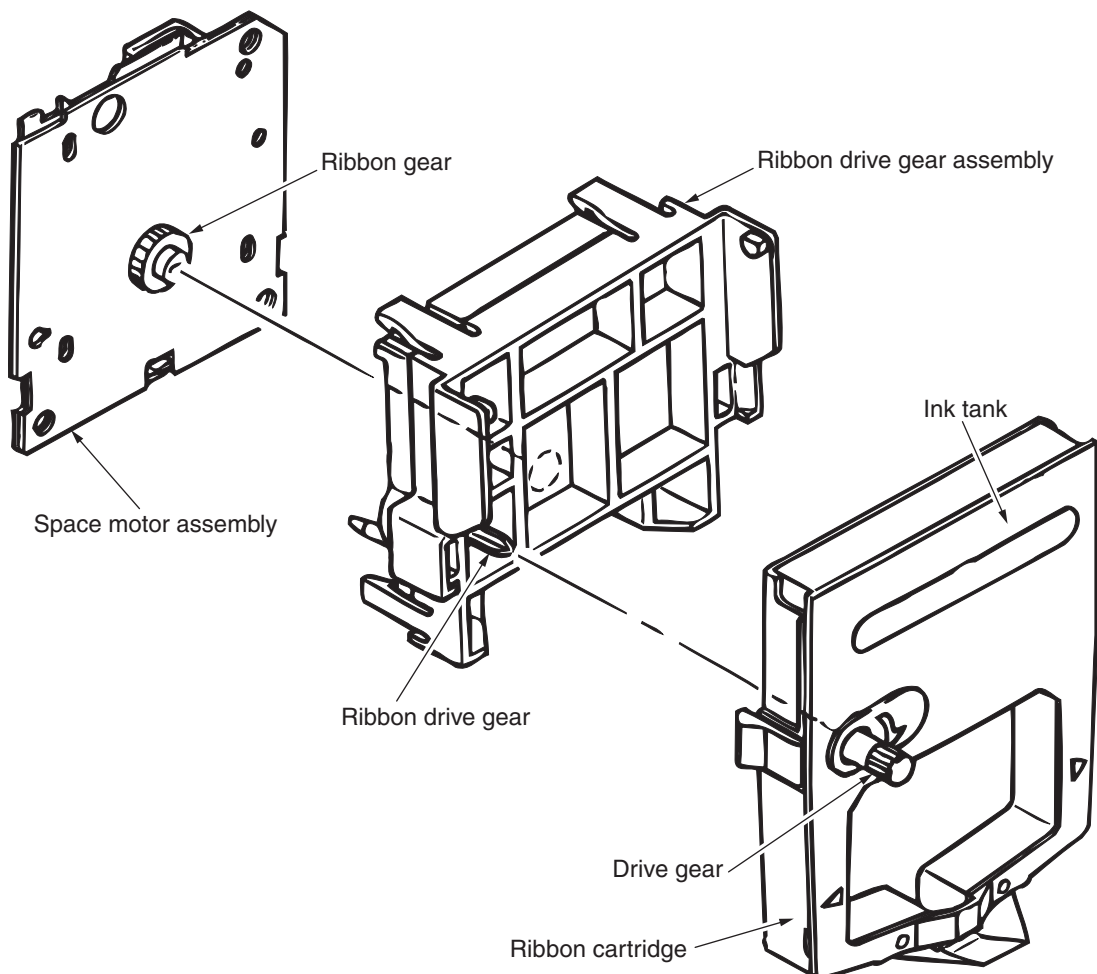


Figure 2-6

2.2.5 Paper feeding

Paper feeding is performed by turning the platen and the pin tractor, which is driven by the LF pulse motor.

The paper feeding mechanism consists of the following items:

- (a) Pulse motor with gears
 - (b) Decelerating gear
 - (c) Platen
 - (d) Tractor feed unit
 - (e) Line feed roller
- (1) Cut-sheet feeding operation (See Figure 2-7.)

The pulse motor used for the paper feeding mechanism is mounted on the left side of the printer frame, and the rotation of the motor is transmitted through decelerating gears (idler gear, platen gear) to the platen. The rotation of the platen is also transmitted to the line feed roller.

It is designed in such a way that if the pulse motor turns 48 steps (360°), paper is fed $1/6$ inch (4.23mm).

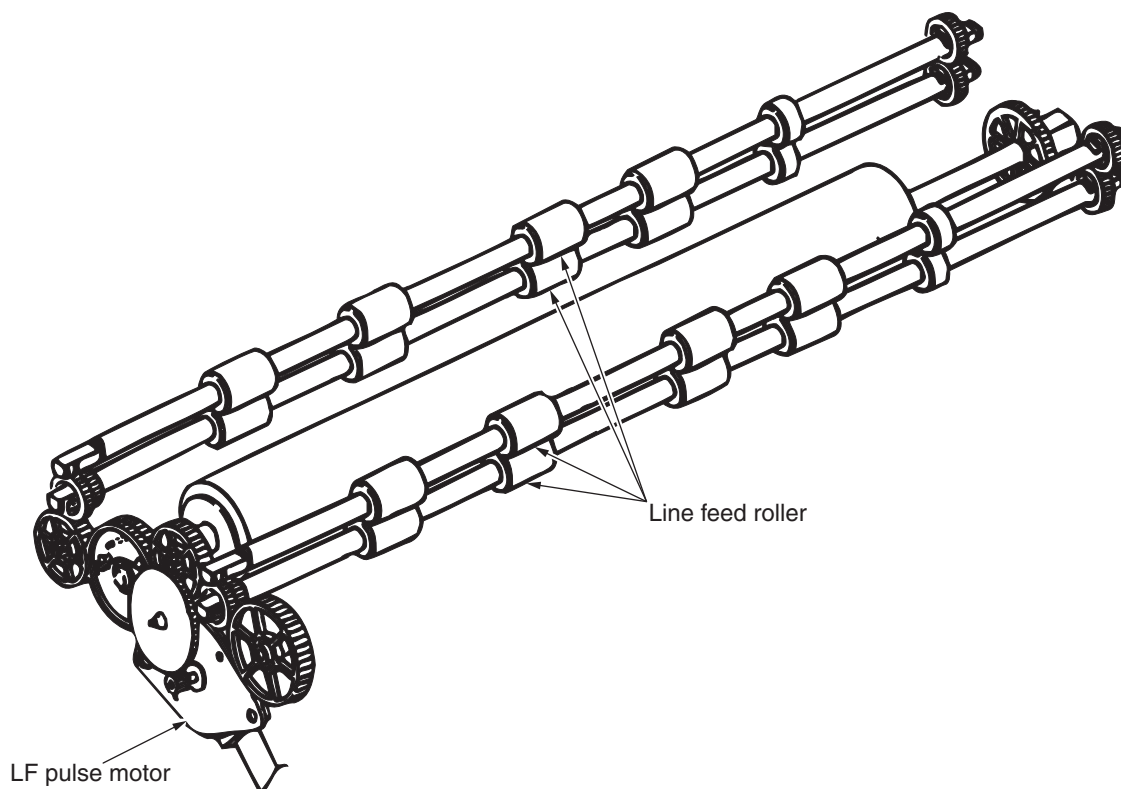


Figure 2-7

(2) Continuous paper feeding operation (See Figure 2-8.)

The LF pulse motor drives the line feed roller and the pin tractor to feed the continuous paper.

- Paper feeding

The pulse motor for paper feeding is located on the left side frame. The pulse motor drives the platen gear assembly via the decelerating gear. The platen gear assembly directly connected to the platen drives the line feed roller via the idle gear. If switched to the change gear, the line feed roller drives the pin tractor. The LF pulse motor is mechanically designed to feed the paper 1/6 inch (4.23mm) with a turn of 48 steps (360°).

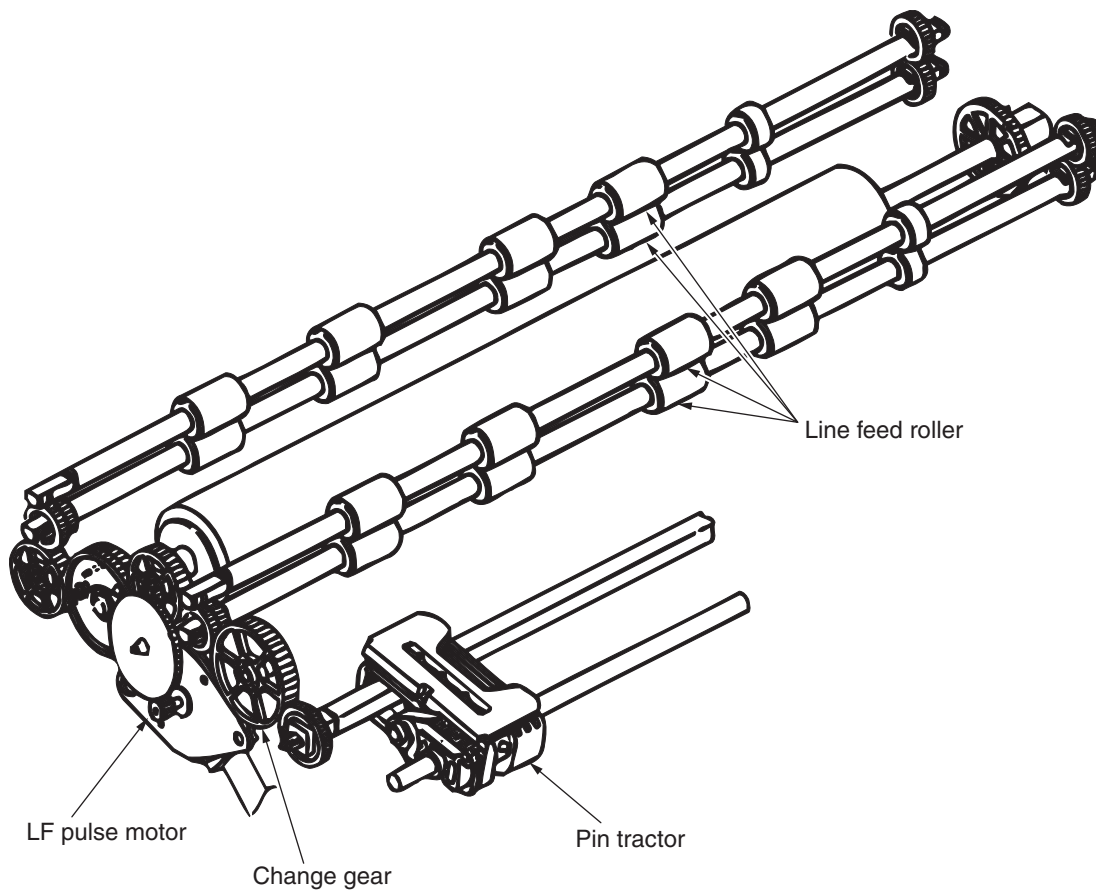
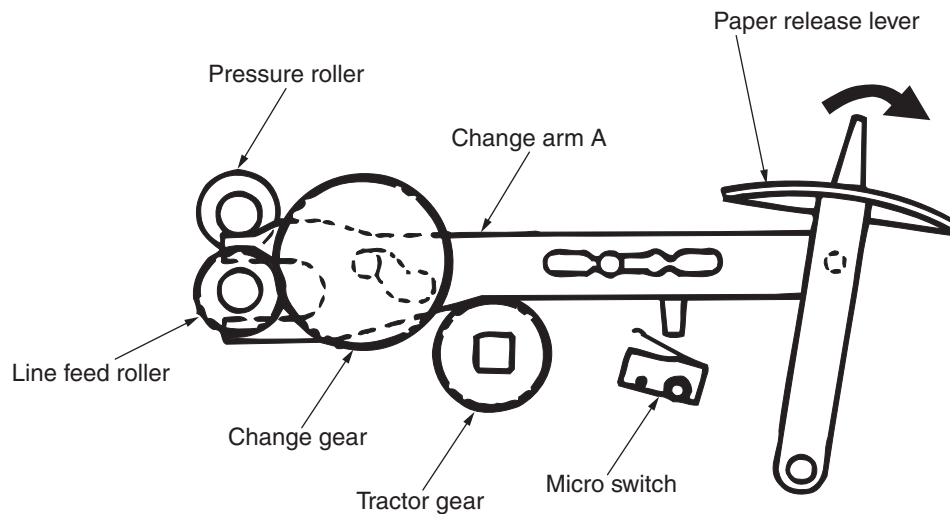


Figure 2-8

(3) Cut-sheet and continuous paper switching mechanism (See Figure 2-9.)

Set the paper release lever to the cutsheet paper position (front). The pressure roller presses on the line feed roller via change arm A. This sets the feeding of cutsheet paper. Set the paper release lever to the continuous forms (rear) position. Change arm A raises the pressure roller to stop pressing the line feed roller. The change gear built into the change arm lowers and switches to the tractor gear side. This sets the feeding of continuous forms.

Cut-sheet



Continuous paper

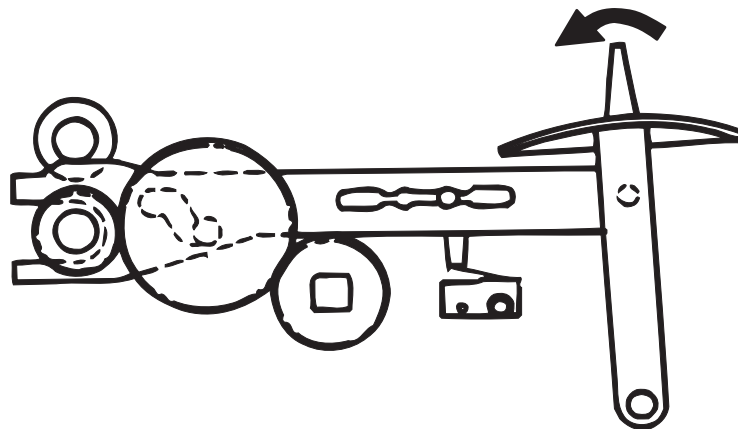


Figure 2-9

2.2.6 Paper end detection (See Figure 2-10.)

When the paper is inserted, the paper end sensor is turned on. This is because the inserted paper prevents the tip of the sensor arm A from entering the upper sheet guide groove. When the paper is out, the tip of the sensor arm A enters the groove of the upper sheet guide and the other side of the sensor arm A intercepts the sensor. Hence, the paper end sensor detects the end of paper. The sensor detects the end of the paper when the remaining paper length is about 22 mm from the print position.

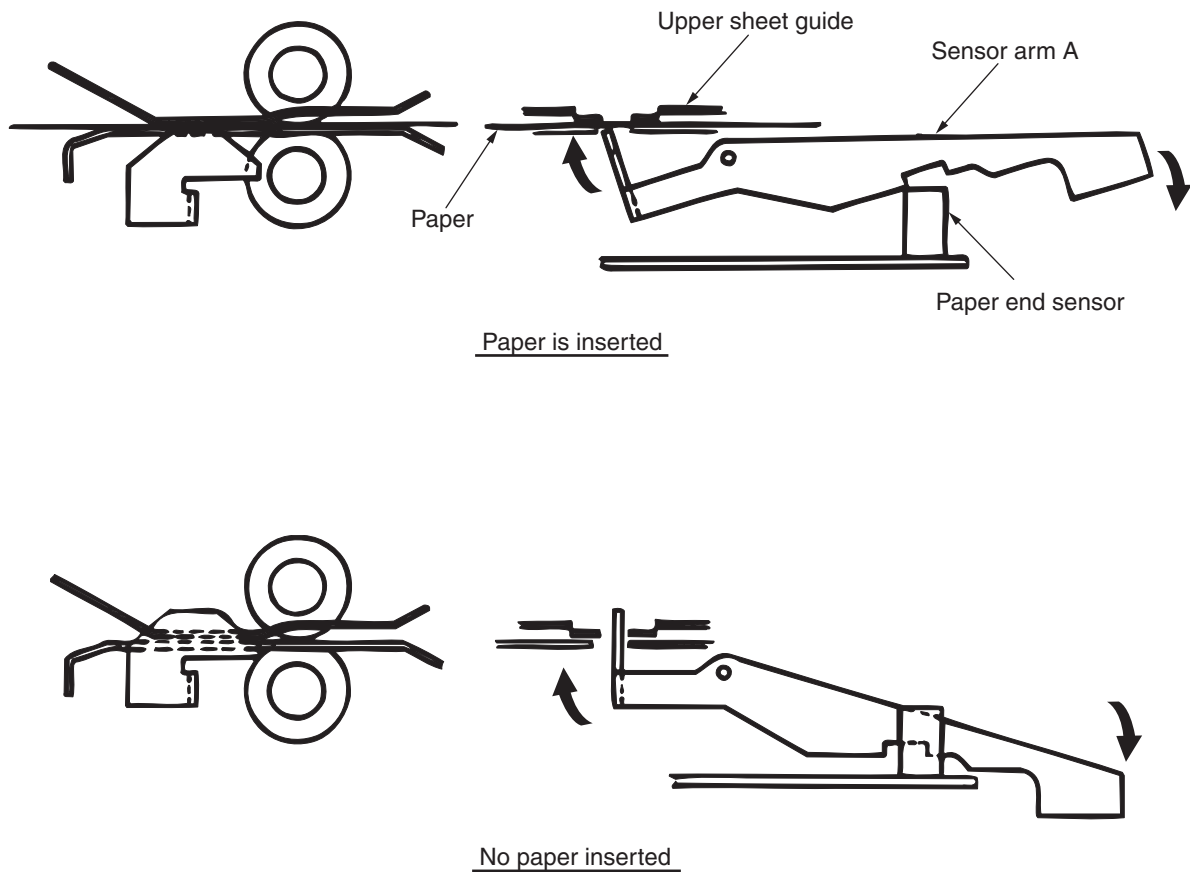


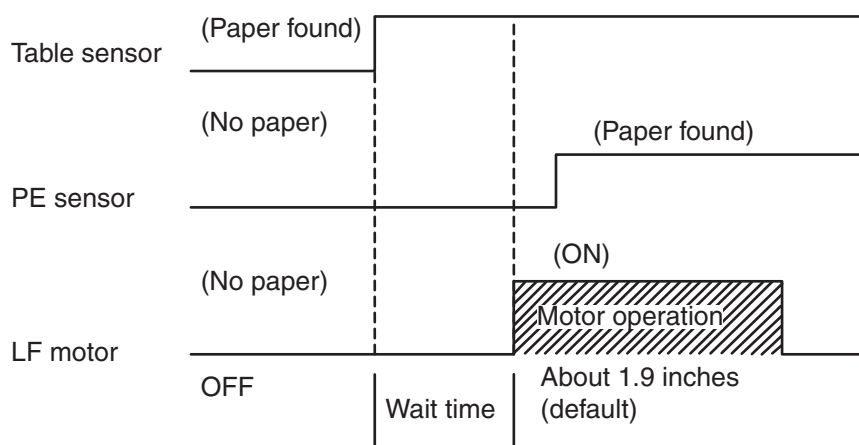
Figure 2-10

2.2.7 Semi-automatic sheet feeder (SASF) (See Figure 2-11.)

This function automatically feeds the cut-sheet or continuous forms set in the table.

(1) Theory of paper feeding

- 1) When the paper is loaded on the table, it is inserted until the table sensor detects the paper.
- 2) Once the sensor detects the paper, line feeding starts after a specified time (*1) (1 sec., 2 sec., or 500 ms).
- 3) The paper is fed into the pre-set paper feed position (*2). This ends the line feeding.



*1 Set up in the menu (wait time; 1 sec., 2 sec., or 500 ms)

*2 The distance from the top of the paper to the center of the character is 6.35mm by default.

Table Sensor Detection

When the paper is on the table, the table sensor is turned on. This is because the paper prevents the tip of the sensor arm B from entering the upper sheet guide groove. When the paper is out, the tip of the sensor arm B enters the groove of the upper sheet guide and the other side of the sensor arm B intercepts the sensor. Hence, the table sensor detects the end of paper.

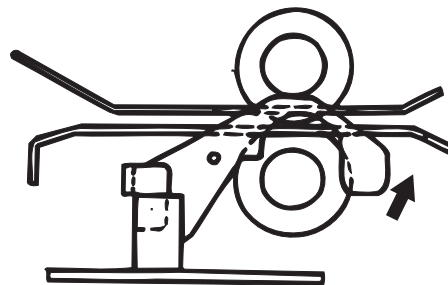
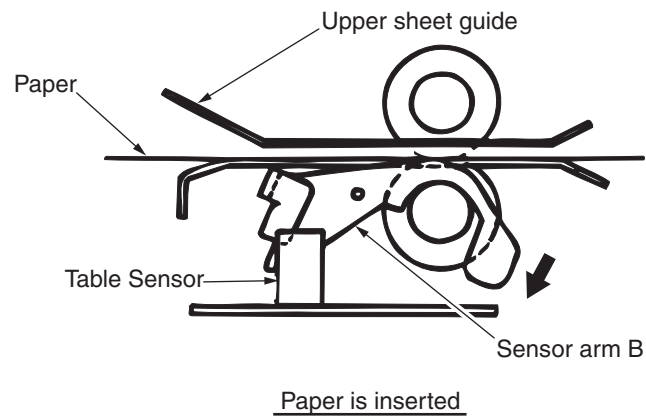
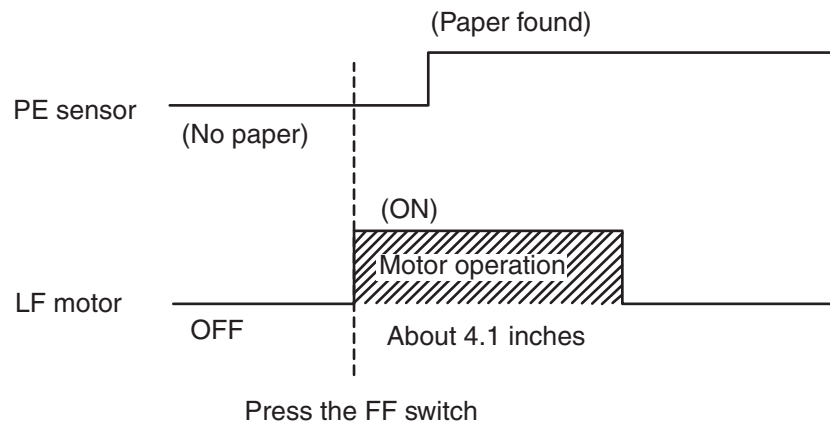


Figure 2-11

(2) When using continuous sheets (auto load)

- 1) Set the paper switch lever to the continuous sheet side.
- 2) Set the paper in the push tractor.
- 3) Push the FF switch.
- 4) Start line feeding and feed the paper up to the print position.
- 5) Feed about 4.1 inches.

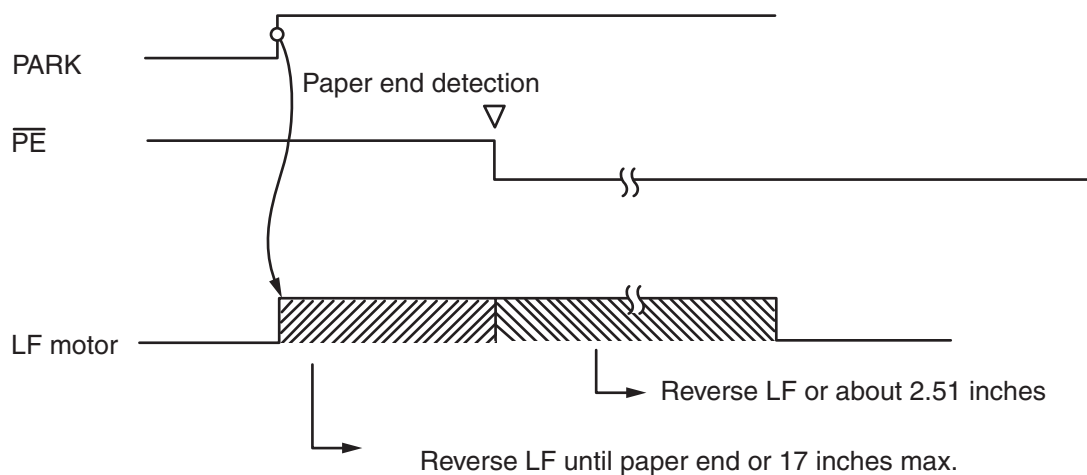


2.2.8 Reversing continuous sheets

Continuous sheets which have been inserted can be reversed automatically by using the PARK switch on the operator panel.

Its operation is as follows:

- 1) Press the PARK switch on the operator panel.
- 2) Reverse LF starts and sheet is fed in the reverse direction until paper end occurs or 17 inches maximum, whichever comes first.
- 3) Then the paper is fed about 2.51 inches in the reverse direction, leaving the sheet on the push tractor only.



3. DISASSEMBLY/REASSEMBLY

3.1 Precautions for Parts Replacement

- (1) Disconnect the AC cable and interface cable before disassembly or reassembly of the printer.
- (a) Turn the AC power switch off. Disconnect the AC input plug of the AC cable from the AC receptacle, then disconnect the AC cable from the printer inlet.

Warning

Risk of Electric Shock

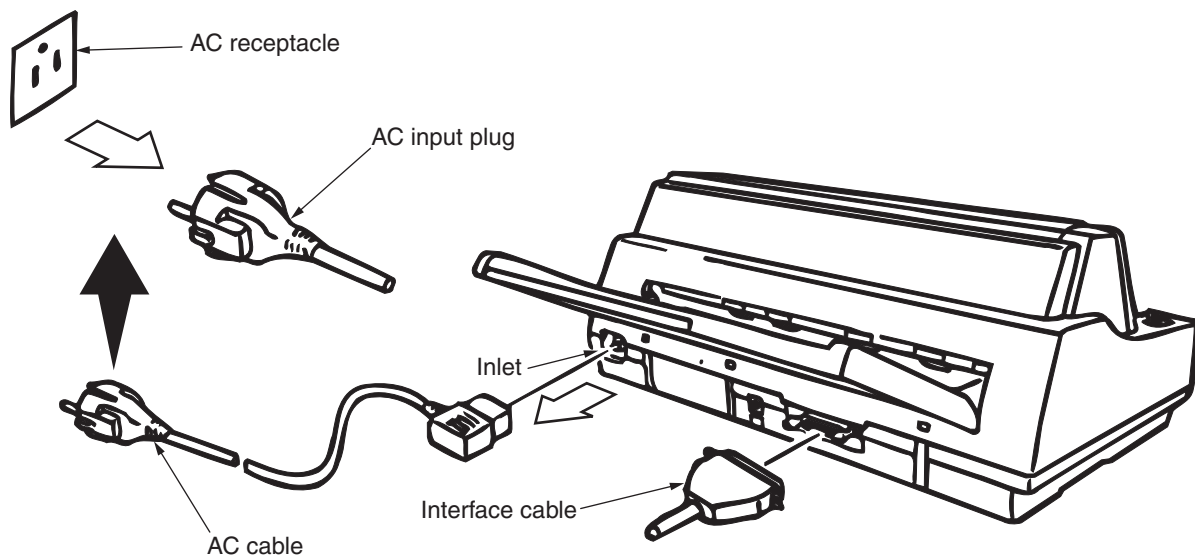


There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (b) To reconnect the AC cable, first connect the AC cable to the printer inlet, then connect it to the AC receptacle.



- (2) Do not disassemble the printer as long as it is in good operating condition.
- (3) Do not remove parts unnecessarily. Disassembly should be kept to the minimum necessary .
- (4) Use only specified maintenance tools.
- (5) Disassemble the printer in the specified order laid out in disassembly procedures.
- (6) ICs such as the microprocessor, ROM, and RAM can be damaged easily by static electricity. Do not wear any kind clothing which may produce static electricity when handling printed circuit boards.
- (7) Do not place the printed circuit boards directly on the printer or floor.

3.2 Maintenance Tools

Table 3-1 lists tools required for replacing parts such as printed boards and units in the field. Other tools may be necessary for other maintenance procedures.

Table 3-1 Maintenance Tools

No.	Maintenance tool	Quantity	Purpose of tool	Remarks
1	No. 1-100 Phillips screwdriver	1	2 to 2.6 mm screw	
2	No. 2-100 Phillips screwdriver	1	3 to 5 mm screw	
3	No. 3-100 screwdriver	1		
4	No. 5 nipper	1		
5	Round pliers No. 3	1		
6	Thickness gauge	1	Head gap adjusting	
7	Flat-blade screwdriver	1	(Removing the upper cover)	

3.3 Disassembly and Reassembly

This section explains the disassembly and reassembly procedures of the printer into the components listed below. Only the disassembly procedures are described. For reassembly, simply reverse these procedures.

- 3.3.1 Upper cover assembly
 - 3.3.2 Space rack
 - 3.3.3 Printer unit
 - 3.3.4 Control board
 - 3.3.5 Sensor board
 - 3.3.6 Power supply board (power supply unit)
 - 3.3.7 Transformer (power supply unit)
 - 3.3.8 Filter board (power supply unit)
 - 3.3.9 LF pulse motor
 - 3.3.10 Platen assembly
 - 3.3.11 Micro switch assembly
 - 3.3.12 Feed roller shaft
 - 3.3.13 Operation board
 - 3.3.14 Tractor assembly (Right, Left)
 - 3.3.15 Table assembly
 - 3.3.16 Feed roller spring
 - 3.3.17 Stacker shaft
- 3.3.18 Print head
 - 3.3.19 Ribbon feed gear assembly
 - 3.3.20 Space motor assembly
 - 3.3.21 Head cable
 - 3.3.22 Guide roller

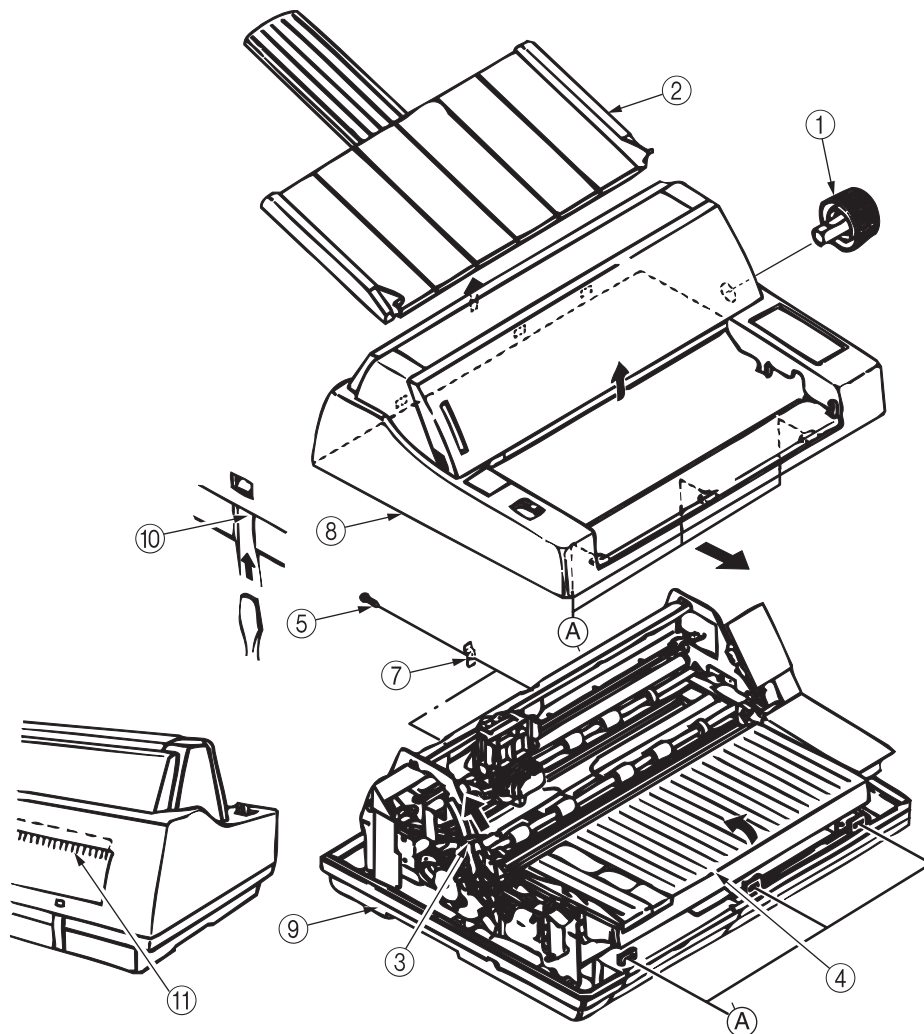
3.3.1 Upper cover assembly

[Note] Remove the cutsheet feeder (option), if mounted.

- (1) Remove the platen knob ① and remove the sheet stacker ②.
- (2) Raise the adjust lever ③ to its upper most position to open table assembly ④.
- (3) Remove the tapping screw ⑤, then remove the cover stopper ⑦ at two locations.
- (4) Disengage the upper cover assembly ⑧ from the lower cover assembly ⑨ in three rear locations. To disengage the upper cover assembly, insert a flat-blade screwdriver into the three grooves ⑩ of the lower cover assembly.
- (5) Disengage the upper cover assembly ⑧ from the lower cover assembly ⑨ in three front locations. To disengage the upper cover assembly, raise the rear part a little and slide it forward using the front part of the upper cover assembly as the fulcrum.
- (6) Lift the upper cover assembly ⑧ up and off the unit.

[Notes on reassembly]

- When reinstalling the upper cover assembly ⑧, be careful to make sure that the discharging brush ⑪ in the rear of the upper cover assembly does not get caught by the upper cover assembly.

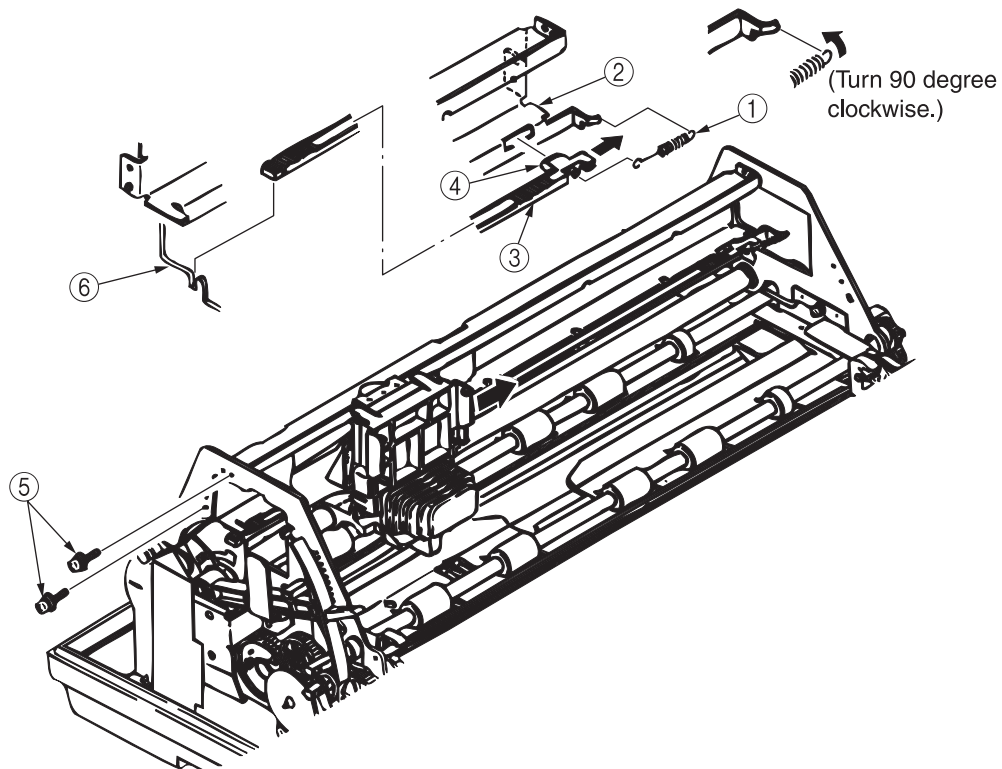


3.3.2 Space rack

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the spring ① and unlock the claw ④ of the space rack ③ from the hole of the carriage guide plate ②.
- (3) Slide the carriage unit to the right.
- (4) Remove the two screws ⑤ to remove the protruding part of the carriage guide plate ②, from the hole of the side frame ⑥.
- (5) Remove the space rack ③ from the notch of the side frame ⑥ and slowly draw it out from the right side.

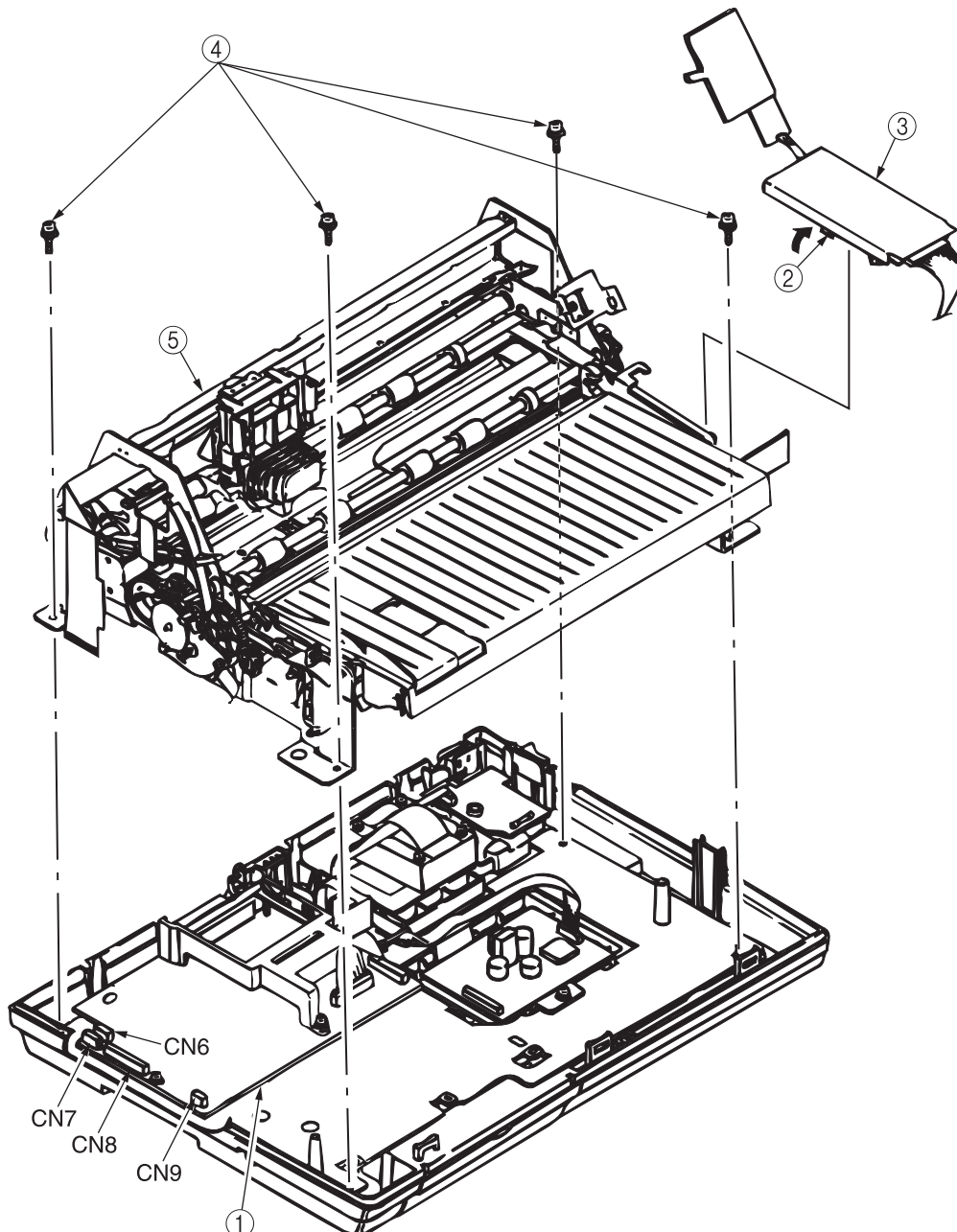
[Notes on reassembly]

- When reinstalling the carriage guide plate ②, make sure that it touches the top surface of the space rack ③.
- Before reinstalling the spring ①, twist the right side of the spring 90° clockwise.
- Make sure to lock the claw ④ of the space rack ③ firmly into the hole of the carriage guide plate ②.
- Firmly insert the protruding part of the carriage guide plate ② into the hole of the side frame ⑥ and fix it in place with screws.
- After reinstallation, check the gap between the print head and the platen and adjust the gap if necessary (see Section 4.1).



3.3.3 Printer unit

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the cable from the connectors (CN6, CN7, CN8, and CN9) of the Control board ①.
- (3) Slide the operator panel assembly ③ closer towards you and draw it out while pressing the claw ②.
- (4) Remove four screws ④ to remove the printer unit ⑤.

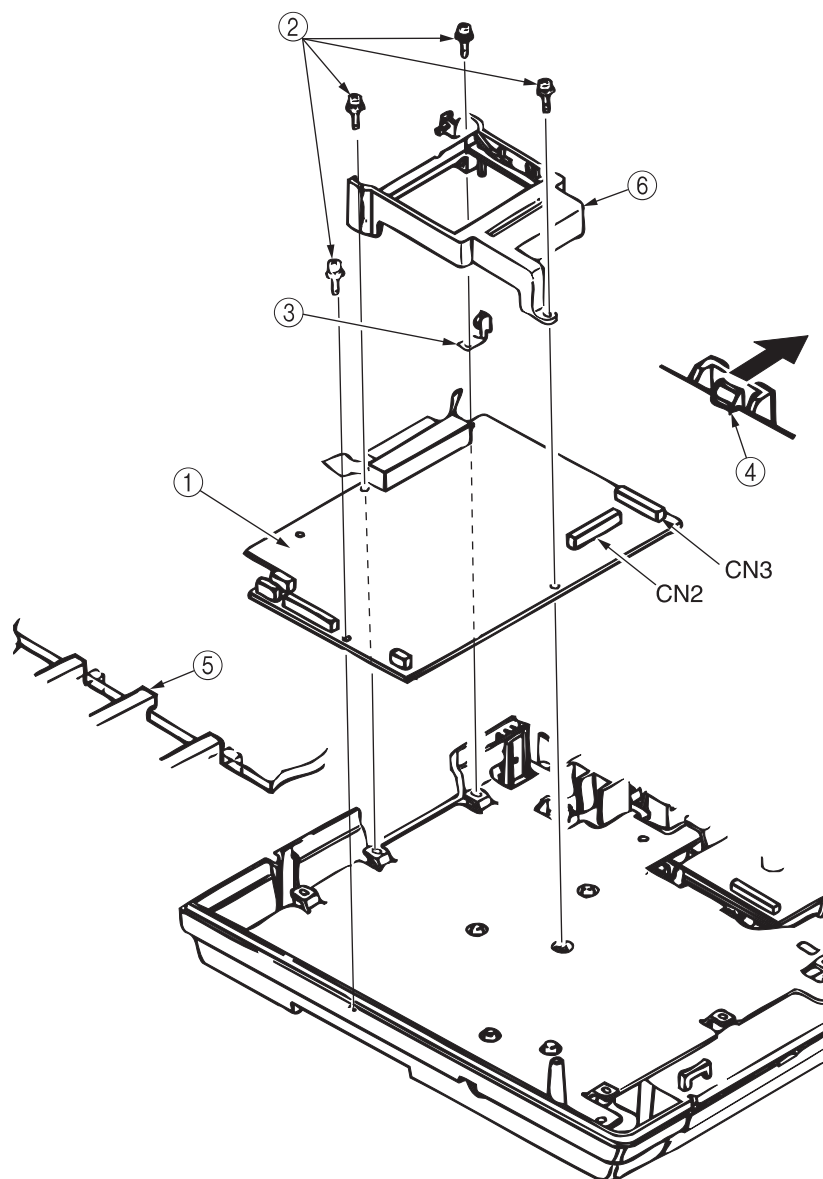


3.3.4 Control board

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove the cable from the connectors (CN2 and CN3) on the Control board ①.
- (4) Remove four screws ②.
- (5) Remove the I/F bracket ⑥ and FG spring ③ at the same time.
- (6) Unlock two claws ④ and remove the Control board ①.

[Notes on reassembly]

- Make sure that the Control board ①, is locked firmly with the two claws ④ and guide ⑤.

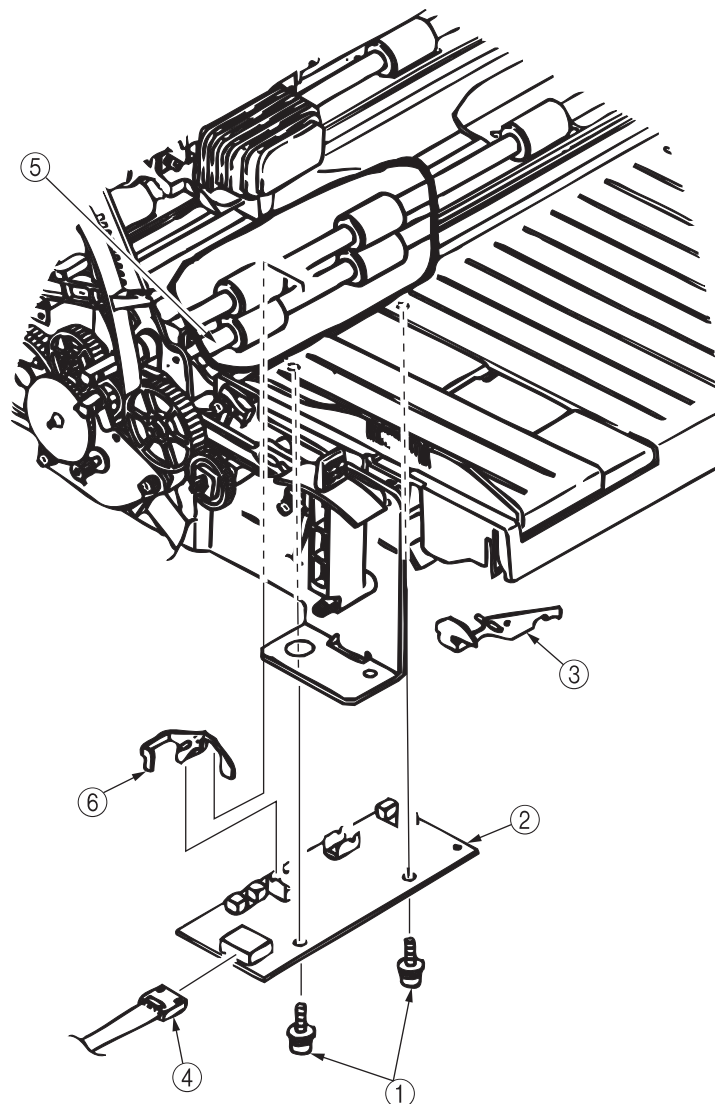


3.3.5 Sensor board

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove two screws ① to remove the Sensor board ② and sensor arm A ③.
- (4) Remove the sensor arm B ⑥ while paying attention to the feed roller shaft ⑤.
- (5) Remove the cable ④ from the Sensor board ②.

[Notes on reassembly]

- Before reinstalling the Sensor board ②, check that the sensor arm A ③ and sensor arm B ⑥ move smoothly.



3.3.6 Power supply board (power supply unit)

Warning

Risk of Electric Shock



There is a risk of electric shock during replacement of the power supply.

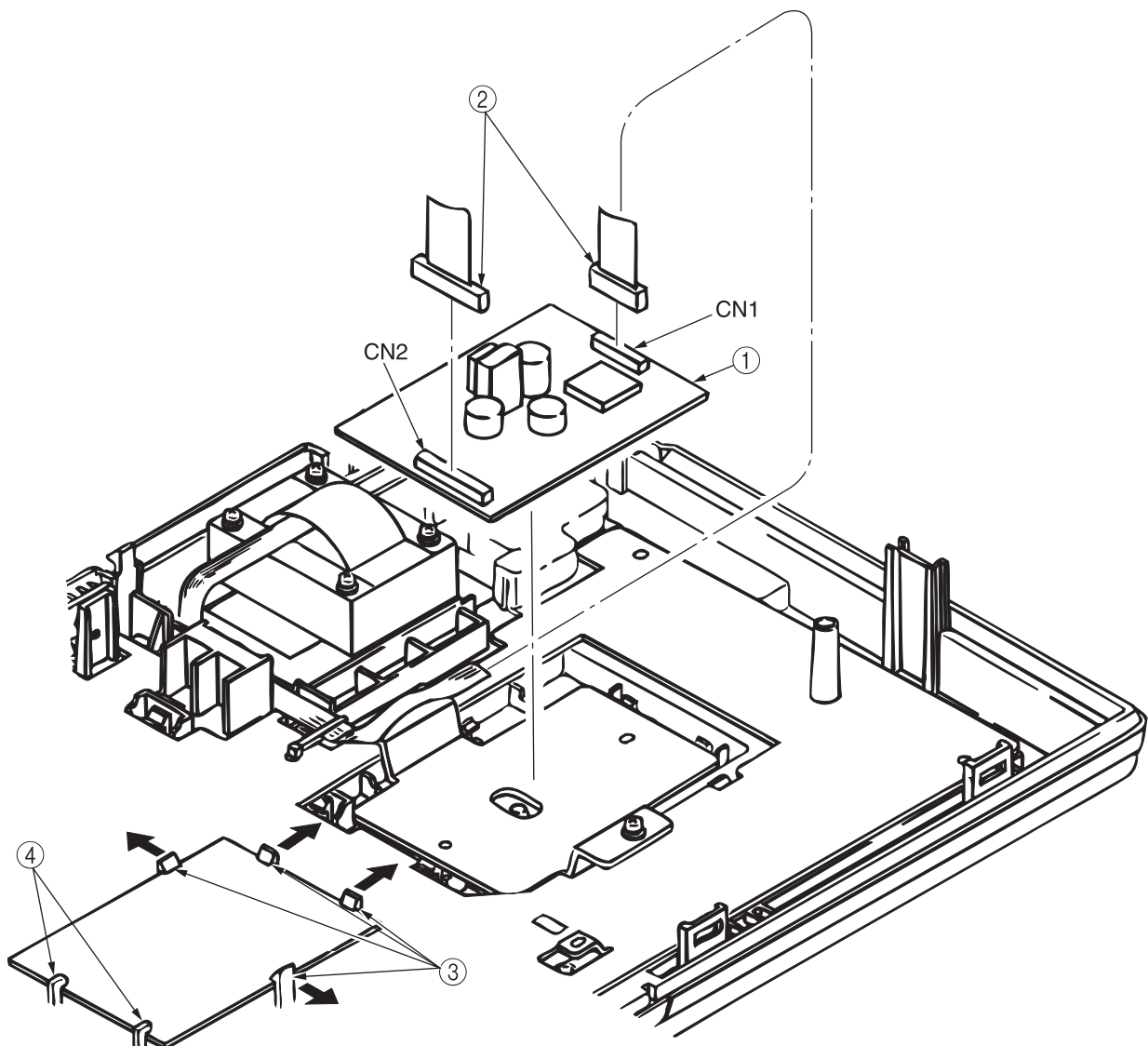
Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove the cable (CN1 and CN2) ② from the power supply board ①.
- (4) Unlock four claws ③ to remove the power supply board ①.

[Notes on reassembly]

- Make sure that the power supply board ① is locked firmly with four claws ③ and two guides ④.



3.3.7 Transformer (power supply unit)

Warning

Risk of Electric Shock

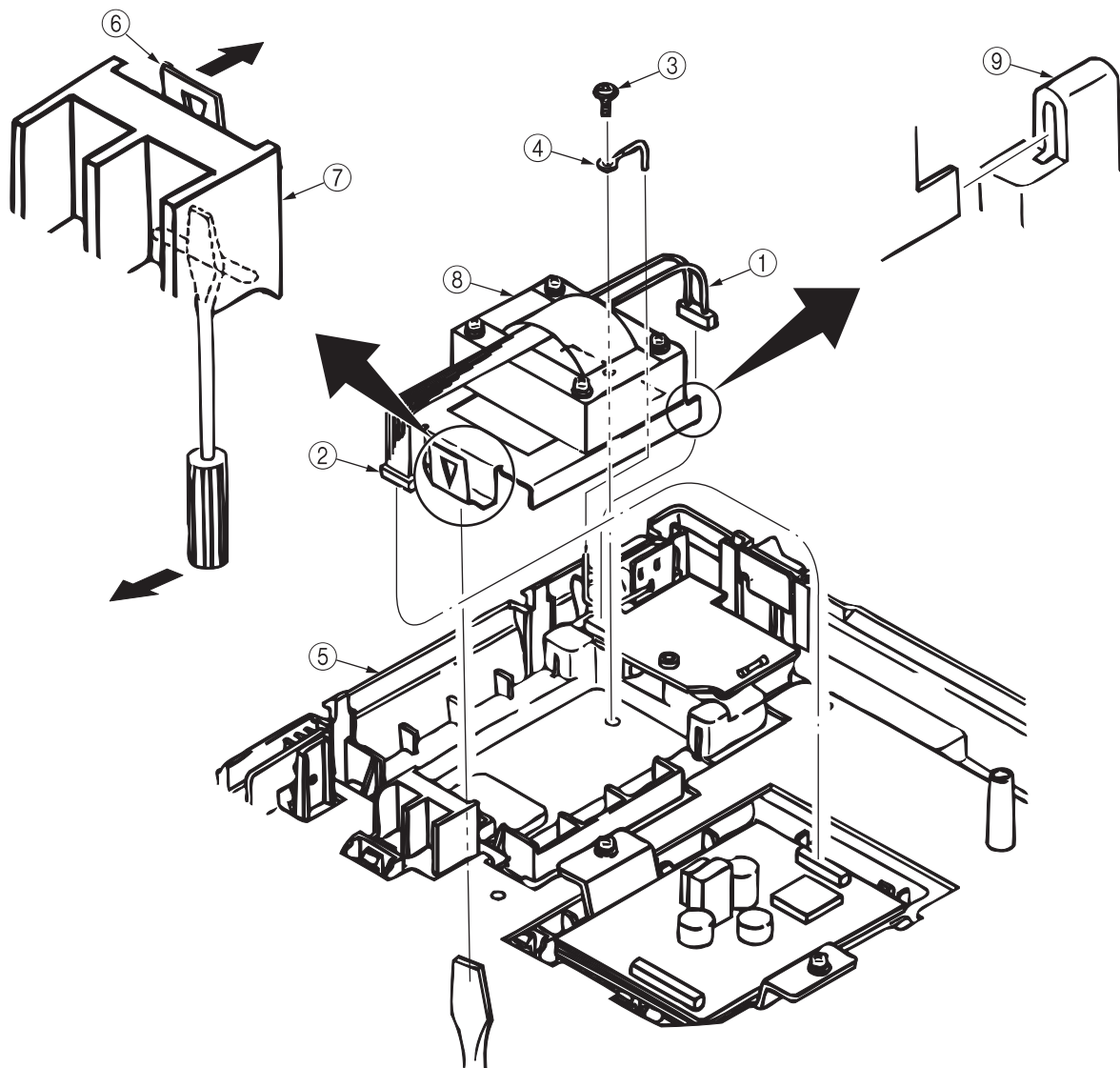


There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove the cable ① from the Filter board and remove the cable ② from the power supply board.
- (4) Remove the screw ③ to remove the ground wire ④.
- (5) Insert the flat-blade screwdriver from the rear lower cover assembly ⑤ and push the lock spring ⑥ to the right to remove the transformer ⑧ from the transformer clamp A ⑦.
- (6) Raise the left side of the transformer ⑧, slide out the transformer ⑧ from the transformer clamp B ⑨.



3.3.8 Filter board (power supply unit)

Warning

Risk of Electric Shock

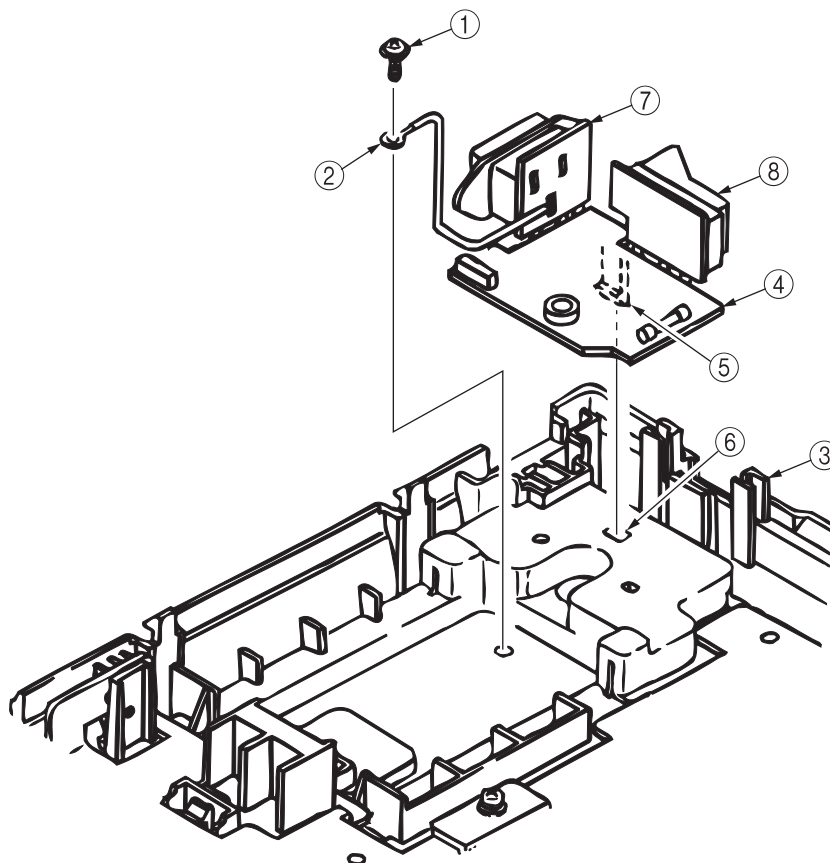


There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove the screw ① to remove the ground wire ②.
- (4) Reach the claw ⑤ of the Filter board ④ from the rear lower cover assembly ③. Release the claw ⑤ from the locking position ⑥.
- (5) Remove the AC inlet ⑦ and AC power switch ⑧ from the guide to remove the Filter board ④.

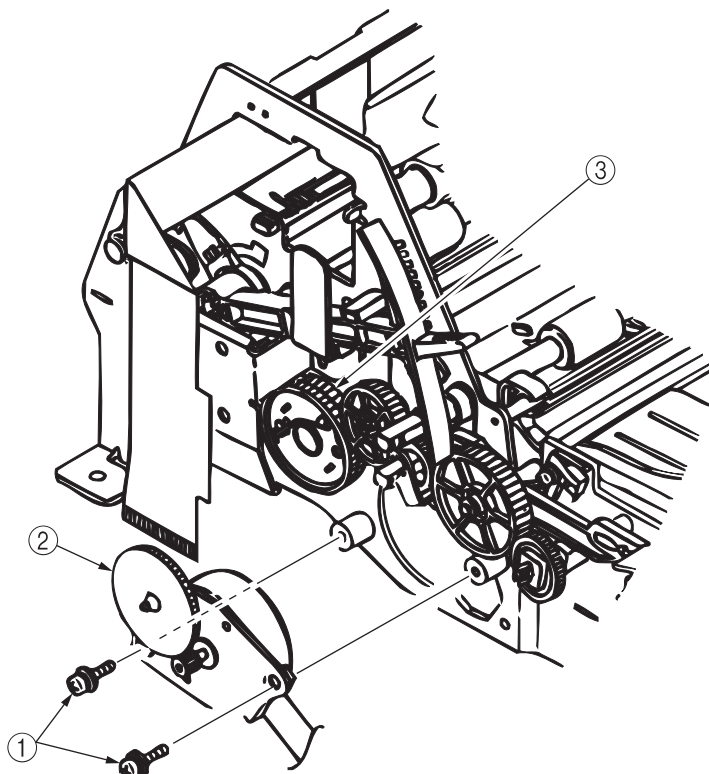


3.3.9 LF pulse motor

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove two screws ① to remove the LF pulse motor ②.

[Notes on reassembly]

- Lightly push the LF pulse motor ② towards the platen gear assembly ③ and fix it in place with the screws ①.

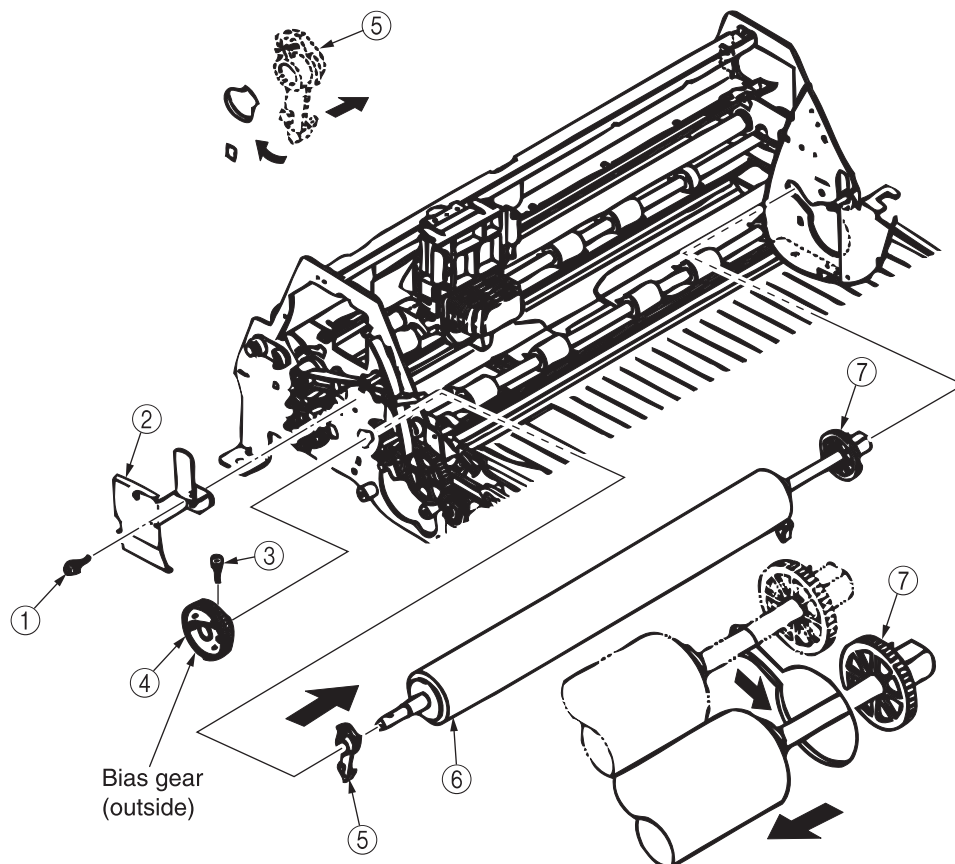


3.3.10 Platen assembly

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove the Sensor board (see Section 3.3.5).
- (4) Remove the LF pulse motor (see Section 3.3.9).
- (5) Remove screw ① to remove the cable guide ②.
- (6) Remove screw ③ to remove the platen gear assembly ④.
- (7) Pull the knob of the platen collar ⑤ so that the protruding part matches the notch of the left side frame. Unlock by moving it inside.
- (8) Slide the platen assembly ⑥ to the right and remove it from the left side frame. Move the platen assembly ⑥ towards you until the hole of the right side frame matches the platen gear ⑦. Move the platen assembly ⑥ further to the left to remove it from the right side frame.

[Notes on reassembly]

- Be careful about the installation orientation of the platen collar ⑤.
- When the platen assembly ⑥ is installed, shift the bias gear of the platen gear assembly ④ half step clockwise to make it engage with the left and right gears.
- After installing the platen assembly ⑥, adjust the LF pulse motor backlash (see Section 3.3.9) and adjust the gap between the print head and the platen (see Section 4.1).



3.3.11 Micro switch assembly

The micro switch assembly consists of three micro switches.

Replace the entire micro switch assembly.

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Cut the tie-wrap ① that fixes the switch cable ② to the left side frame ③.
- (4) Remove the micro switch A.

Remove screw ④ to remove the micro switch A ⑤ (be careful not to lose the nut ⑥ that comes off at the same time).

- (5) Remove the micro switch B.

Remove screw ⑦ to remove the micro switch B ⑧.

- (6) Remove the micro switch C.

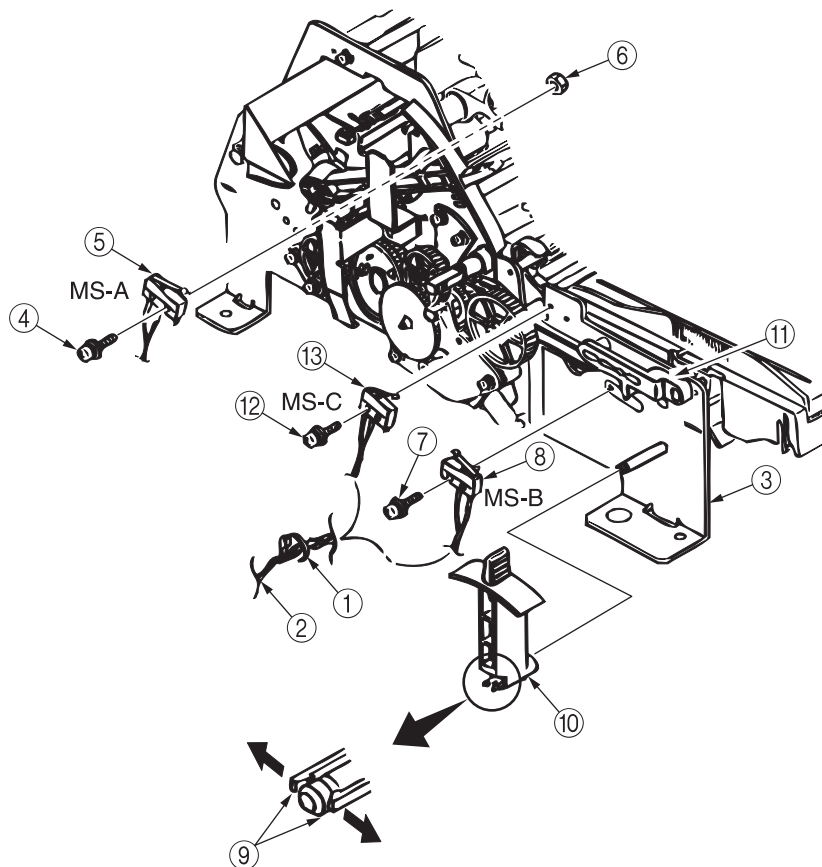
i) Unlock the claw ⑨ to remove the paper release lever ⑩.

ii) Remove the change lever A ⑪ from the post and pull downward.

iii) Remove screw ⑫ to remove the micro switch C ⑬.

[Notes on reassembly]

- After installing the micro switch A, adjust the position (see Section 4.2).
- When installing micro switches A, B, and C, be careful not to get them installed at wrong locations.

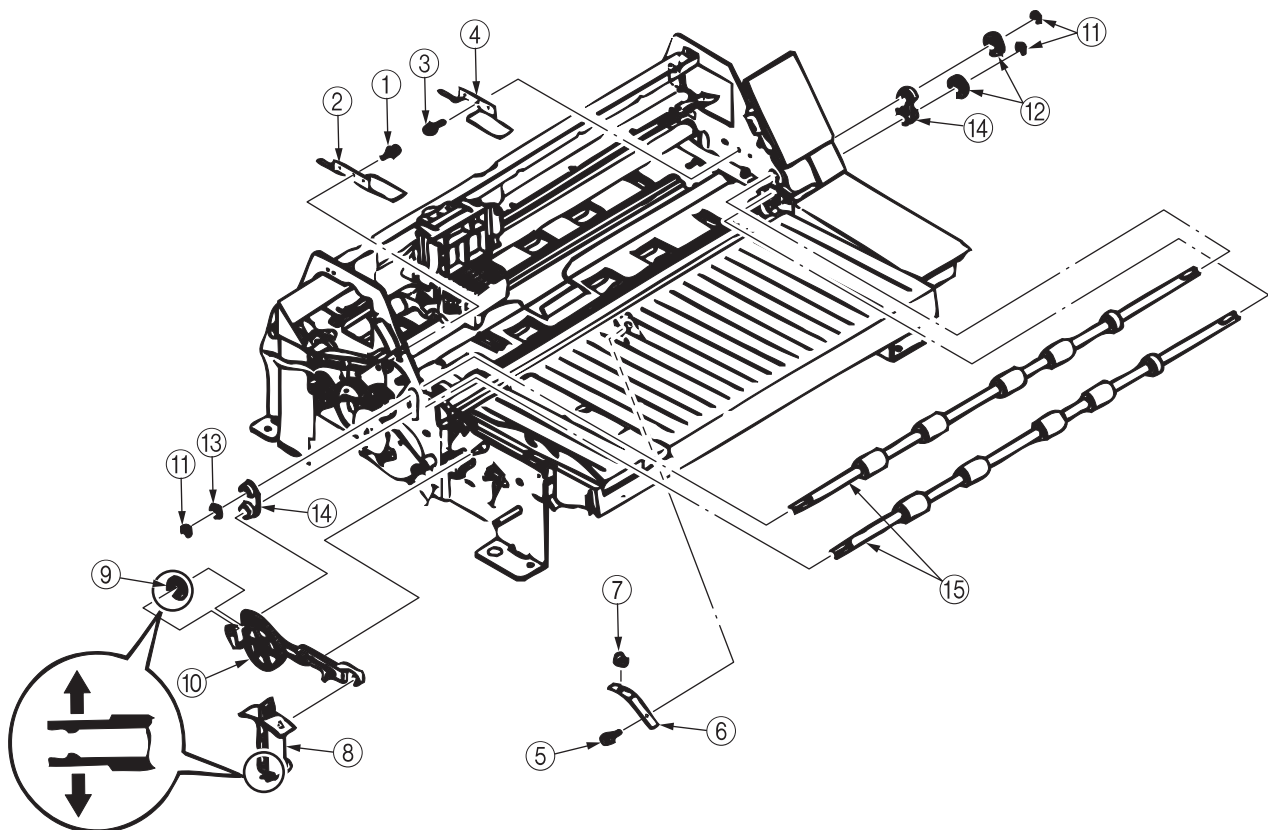


3.3.12 Feed roller shaft

There are four feed roller shafts, two each on the front and the rear. Replacement procedures are described below.

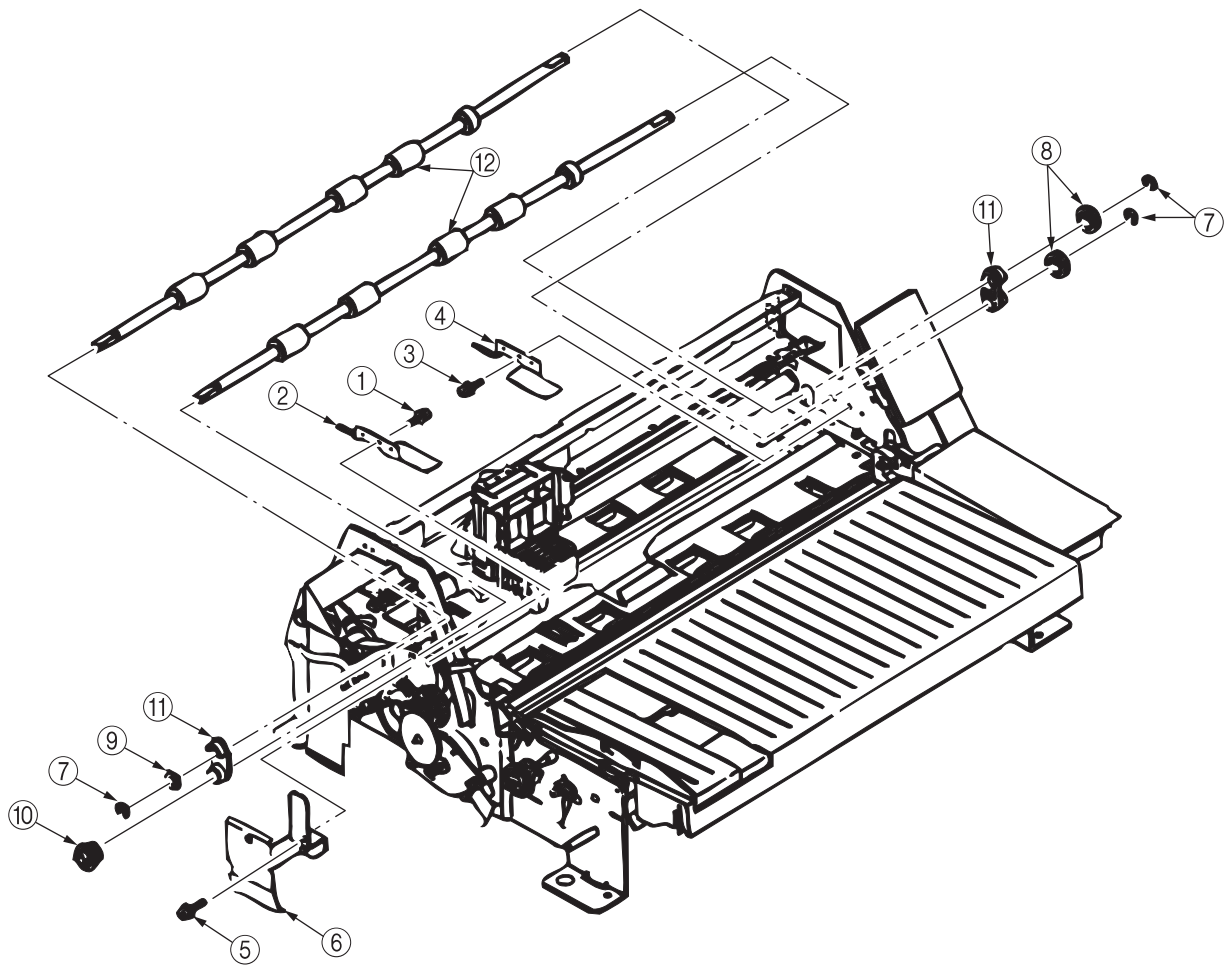
• Front

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove screw ① to remove the feed roller spring A ②.
- (4) Remove screw ③ to remove the feed roller spring B ④.
- (5) Remove screw ⑤ to remove the feed roller spring C ⑥ (be careful not to lose the pressure roller piece ⑦ that comes off at the same time).
- (6) Remove the Sensor board (see Section 3.3.5).
- (7) Unlock the claw, then remove the change lever ⑧.
- (8) Unlock the claw of the LF gear ⑨, then remove the change gear bracket assembly ⑩.
- (9) Remove three E-clips ⑪, two LF knob gears ⑫ (Right), flange ⑬ (Left), and two LF bushes ⑭ (Left and Right).
- (10) Remove the two feed roller shafts ⑮.



• Rear

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the printer unit (see Section 3.3.3).
- (3) Remove screw ① to remove the feed roller spring A ②.
- (4) Remove screw ③ to remove the feed roller spring B ④.
- (5) Remove screw ⑤ to remove the cable guide ⑥.
- (6) Remove three E-clips ⑦ , two LF knob gears ⑧ (Right), and flange ⑨ (Left).
- (7) Remove the LF gear ⑩ (Left), and two LF bushes ⑪.
- (8) Remove the two feed roller shafts ⑫.

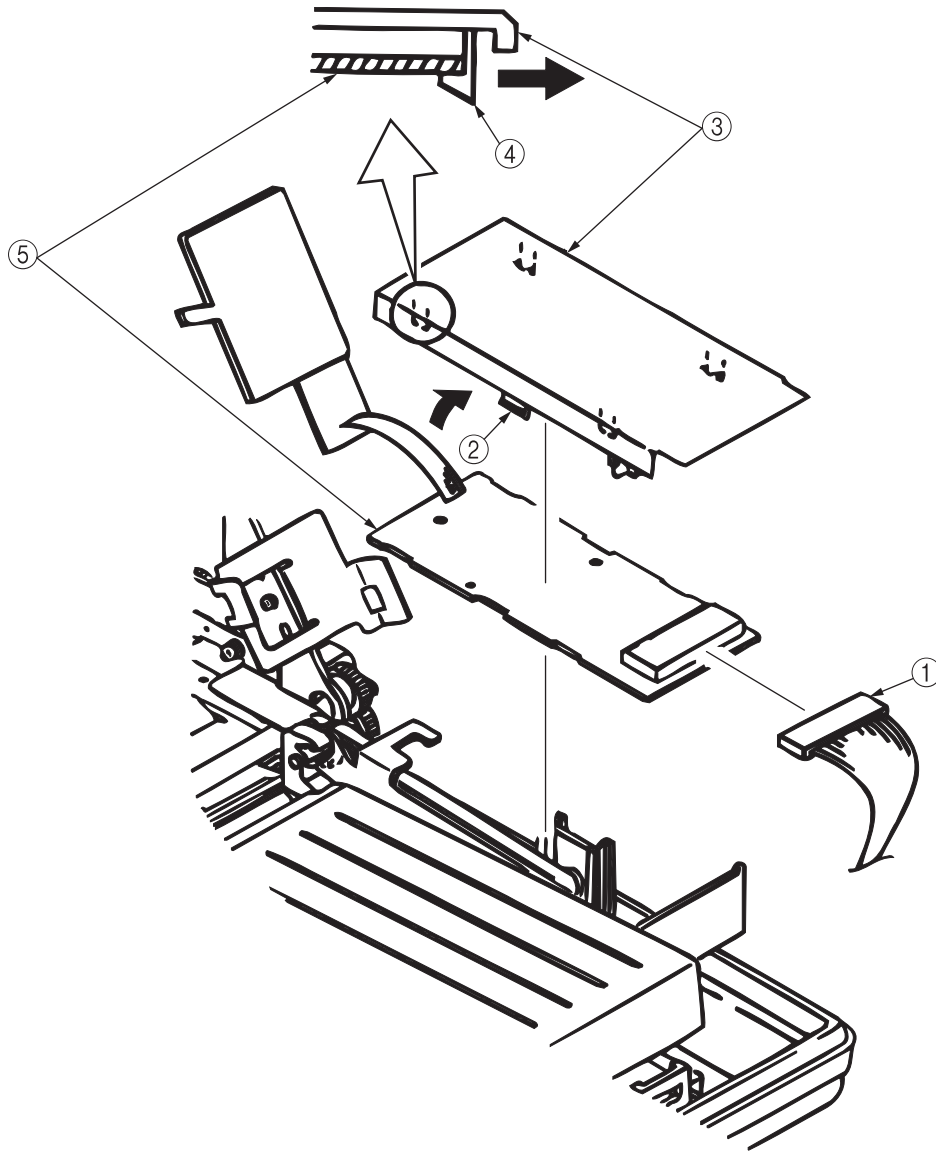


3.3.13 Operation board

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the cable ① and lift up the operator panel assembly ③, while pressing the claw ②.
- (3) Unlock four claws ④ to remove the Operation board ⑤.

[Notes on installation]

- Lock the Operation board ⑤ firmly in place with four claws ④.

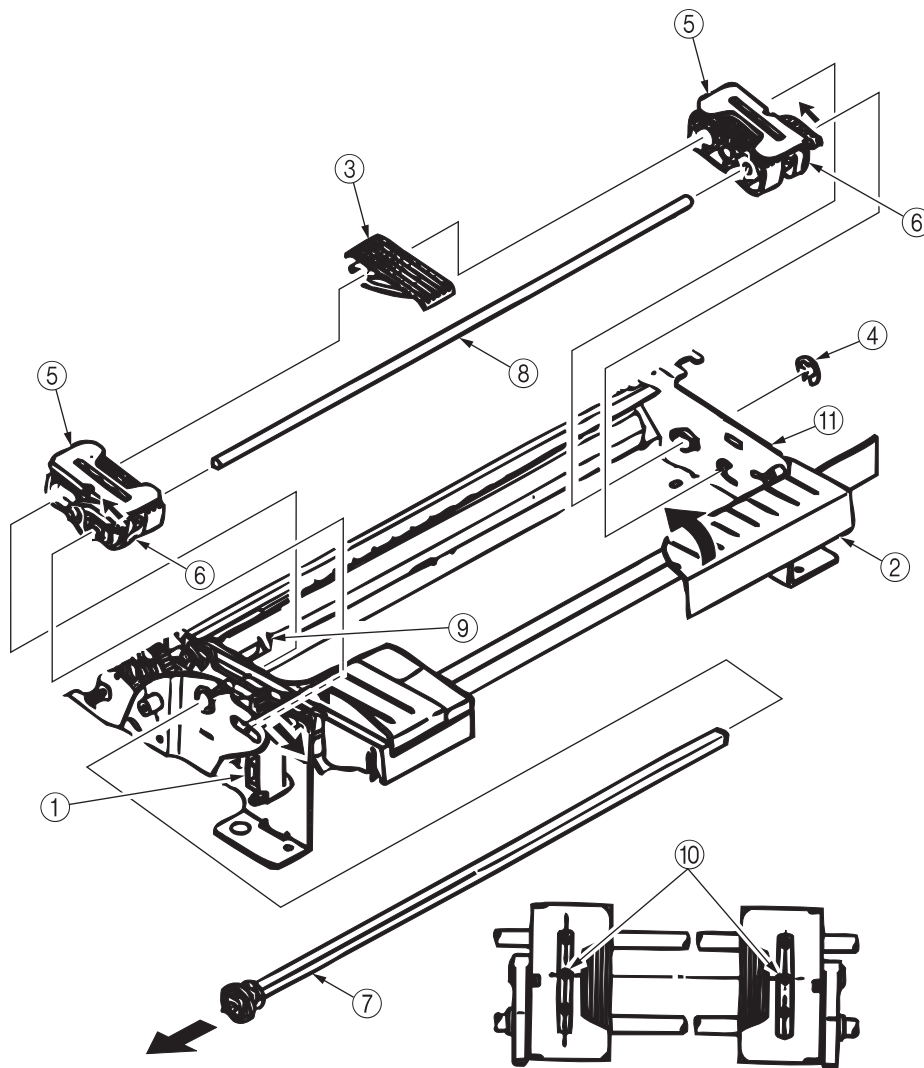


3.3.14 Tractor assembly (Right, Left)

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Lower the paper release lever ① to the open the table assembly ②.
- (3) Remove the sheet guide ③ to remove E-clips ④.
- (4) Raise (unlock) the lock lever ⑥ of the left and right tractor assemblies ⑤. Slide out the tractor shaft ⑦ to the left.
- (5) Take out the left and right tractor assemblies ⑤ together with the tractor guide shaft ⑧.
- (6) Detach the left and right tractor assemblies ⑤ from the tractor guide shaft ⑧.

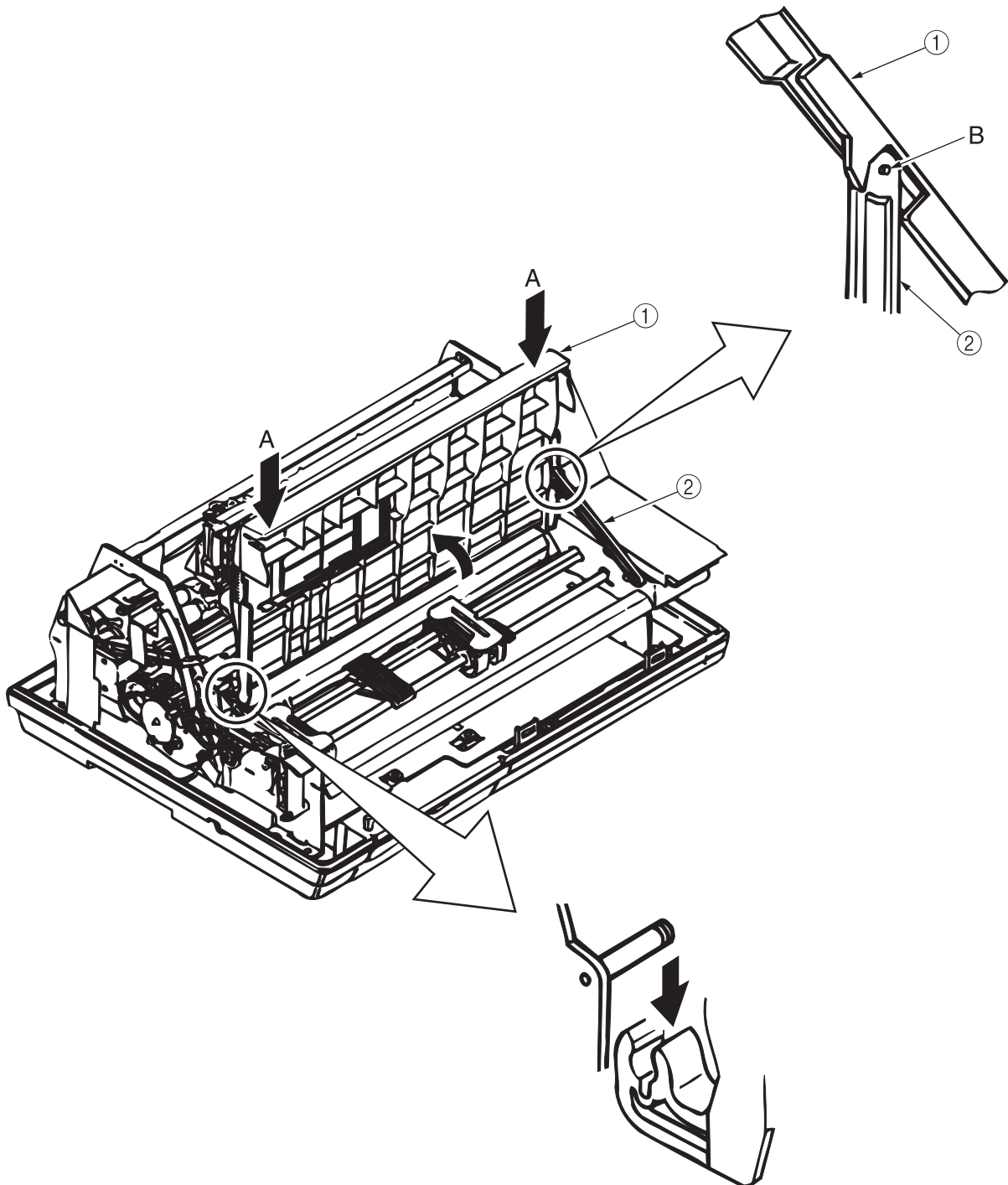
[Notes on reassembly]

- Reinstall the left tractor assembly further left than the bracket ⑨.
- When reinstalling the tractor shaft ⑦, match the left and right tractor assemblies ⑤ and the position of the sprocket-pin ⑩.
- Fit the tractor guide shaft ⑧ in the U-groove of the right side frame ⑪.



3.3.15 Table assembly

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Open the table assembly ①.
- (3) Push section A (two locations on left and right) until the fulcrum is unlocked.
- (4) Remove the lock stay ② from the fulcrum B of the table assembly ①, then disengage the table assembly ①.

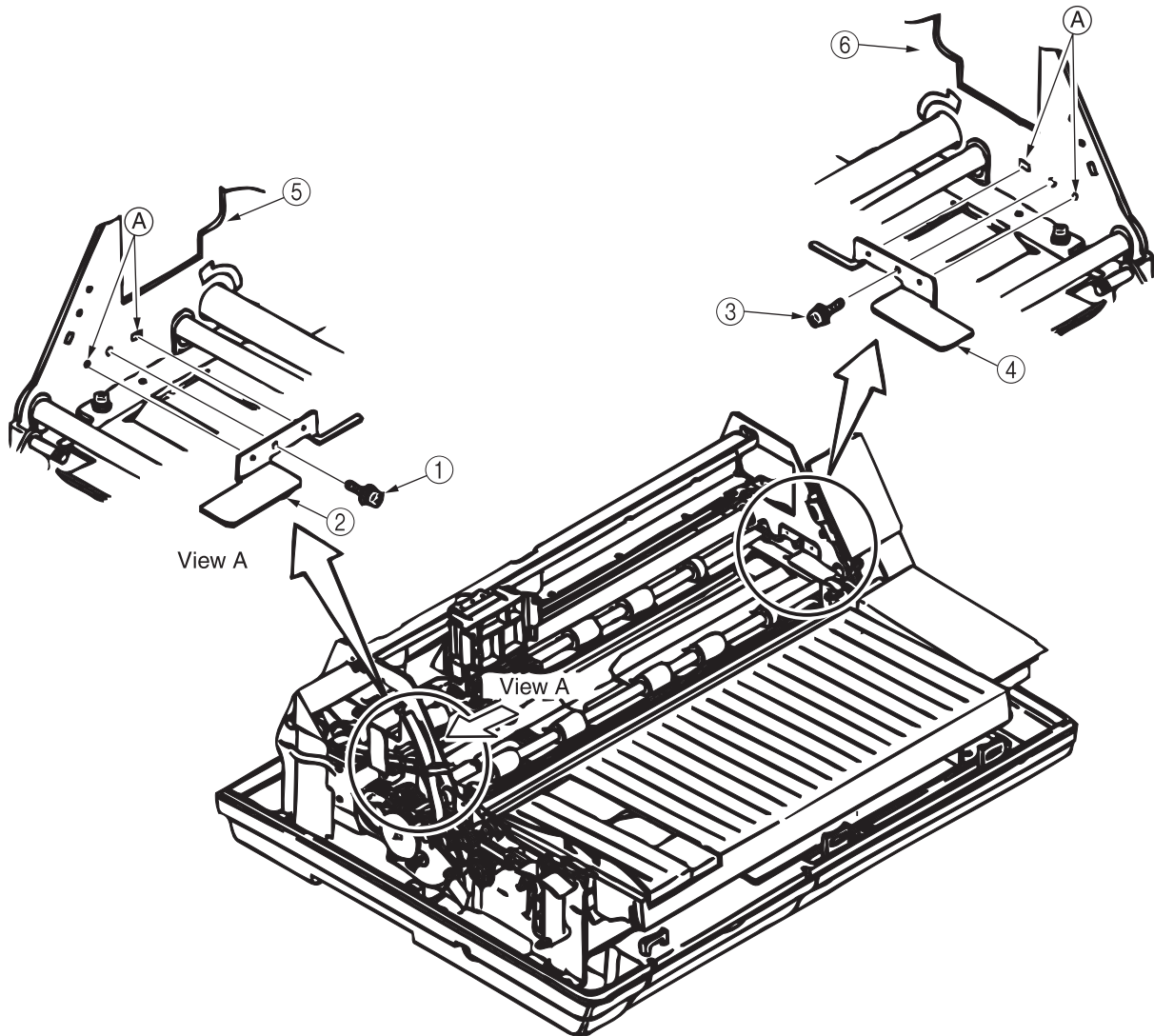


3.3.16 Feed roller spring

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove screw ①, then remove the feed roller spring A ②.
- (3) Remove screw ③, then remove the feed roller spring B ④.

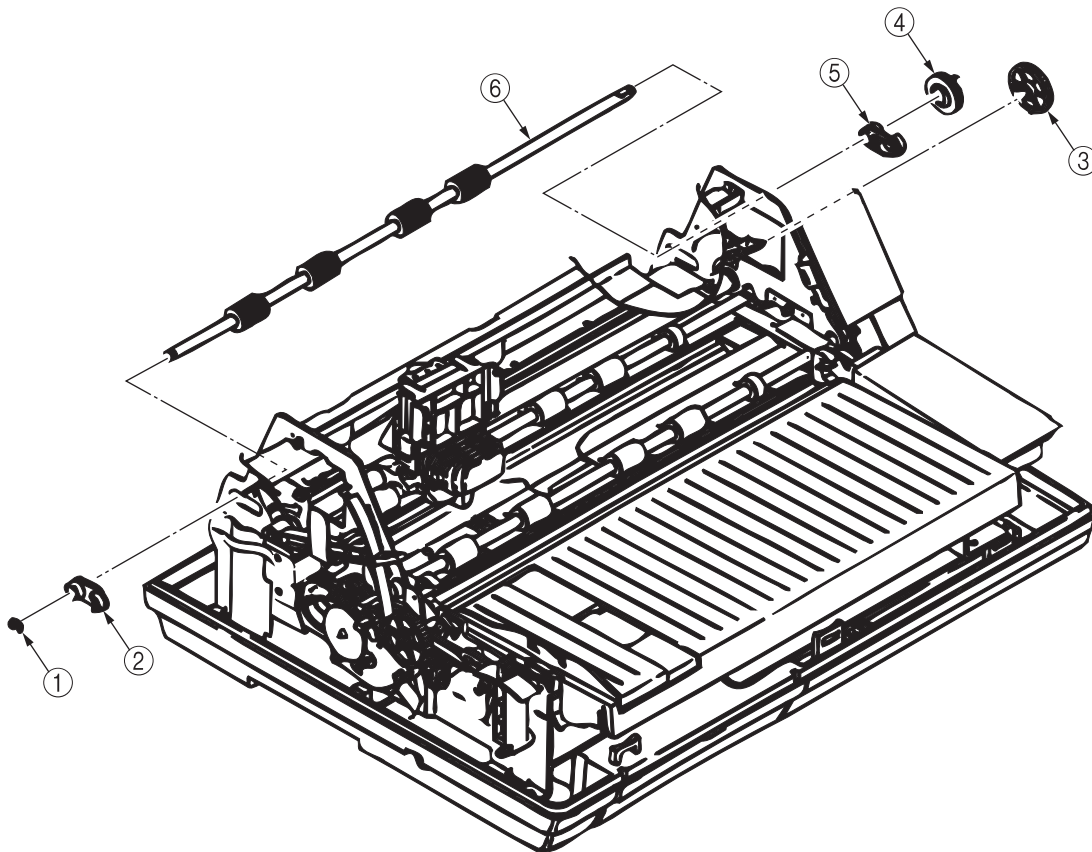
[Notes on reassembly]

- Ensure that the feed roller springs A ② and B ④ are placed firmly into holes ⑤ and ⑥, then fix them in place with screws ① and ③.



3.3.17 Stacker shaft

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove E-clips ①, then remove the LF bush ②.
- (3) Remove the idle gear B ③ (rear).
- (4) Remove the stacker gear L ④, then remove the LF bush ⑤.
- (5) Remove the stacker shaft ⑥.



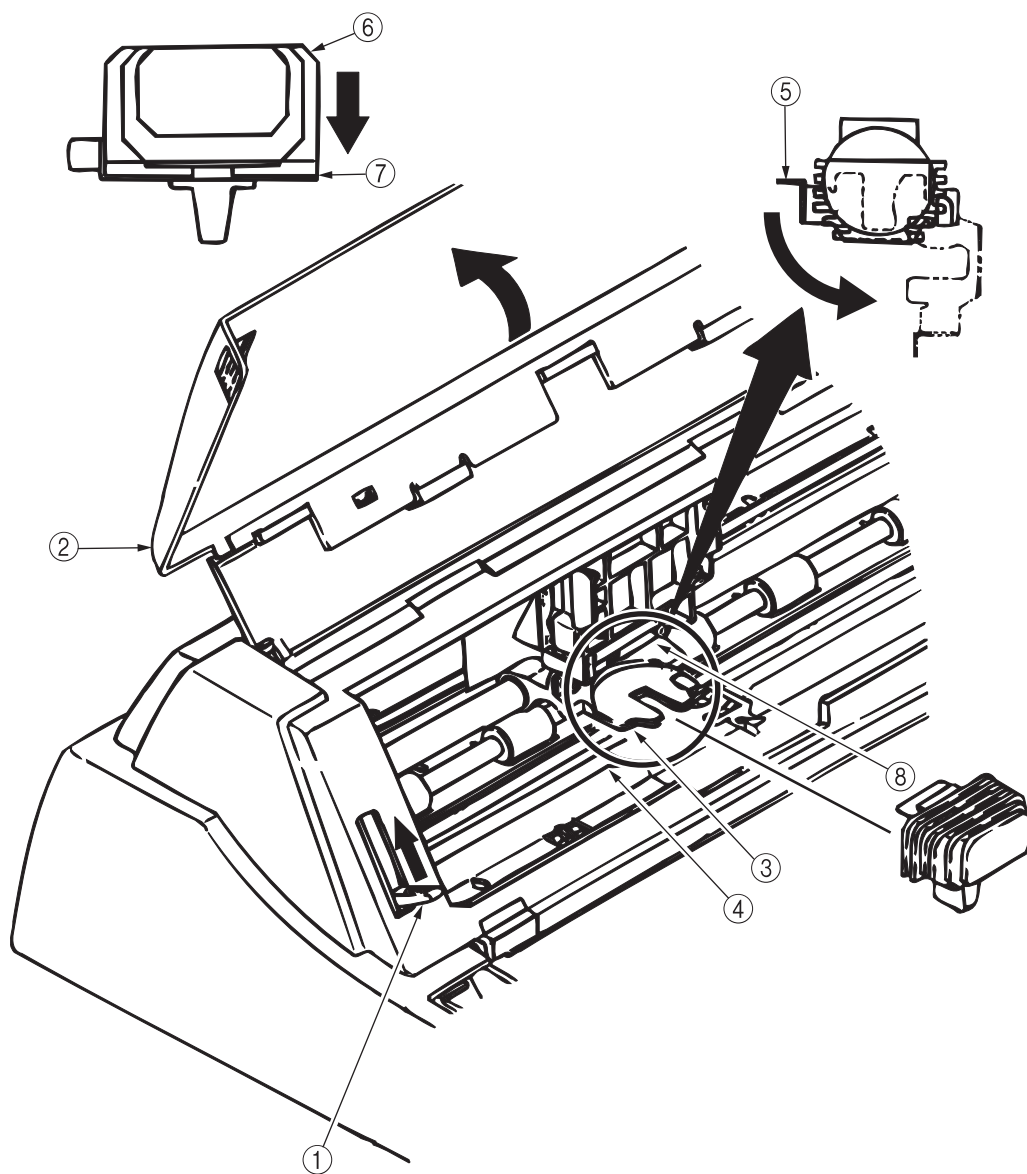
3.3.18 Print head

[Note] The print head is excessively hot immediately after printing.
Wait until print head cools or use a protector to replace the printer head.

- (1) Lift the adjusting lever ① to open the access cover ②.
- (2) Move the carriage unit ③ to the center of the notch of the upper sheet guide ④.
- (3) Slide the head clamp ⑤ towards you and unlock the print head ⑥.
- (4) Slide the print head ⑥ towards you to remove it.

[Notes on reassembly]

- Connect the connector ⑧ while pressing the print head ⑥ against the carriage frame ⑦.
- Lock the head clamp ⑤ firmly in place between the print head ⑥ and the carriage frame ⑦.

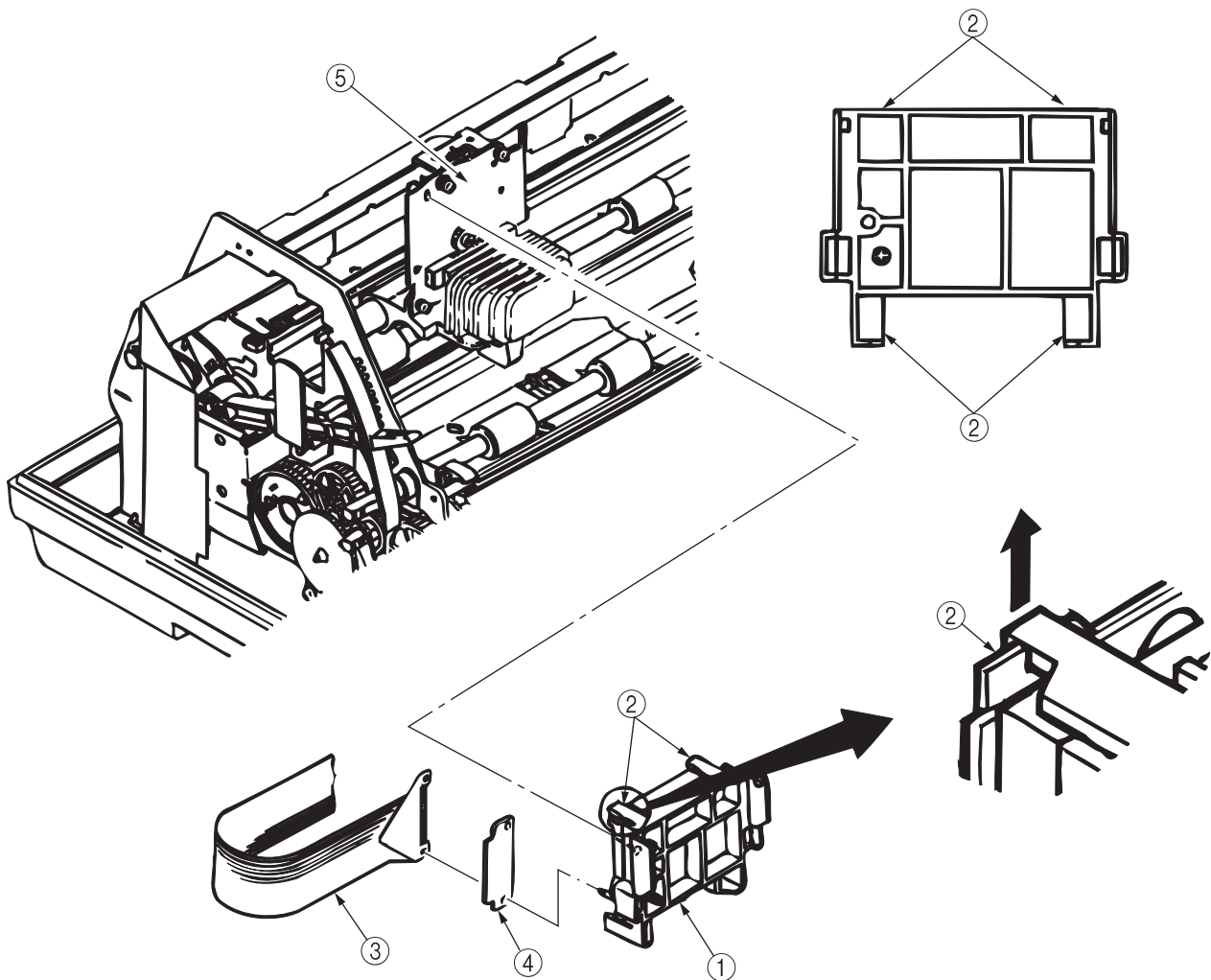


3.3.19 Ribbon feed gear assembly

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the print head (see Section 3.3.18).
- (3) Unlock four claws ② and remove ribbon feed gear assembly ① while sliding it towards you (insert the flat-blade screwdriver into the hole to disengage the claw).
- (4) Remove the head cable ③, and contact pressure rubber ④ from the ribbon feed gear assembly ①.

[Notes on reassembly]

- Do not touch the uncovered terminal (pressure welding point) of the space motor assembly ⑤ and head cable ③. Also, do not allow any dust to come in contact with the uncovered terminal and head cable.
- Handle the head cable ③ carefully so that no creases are made.

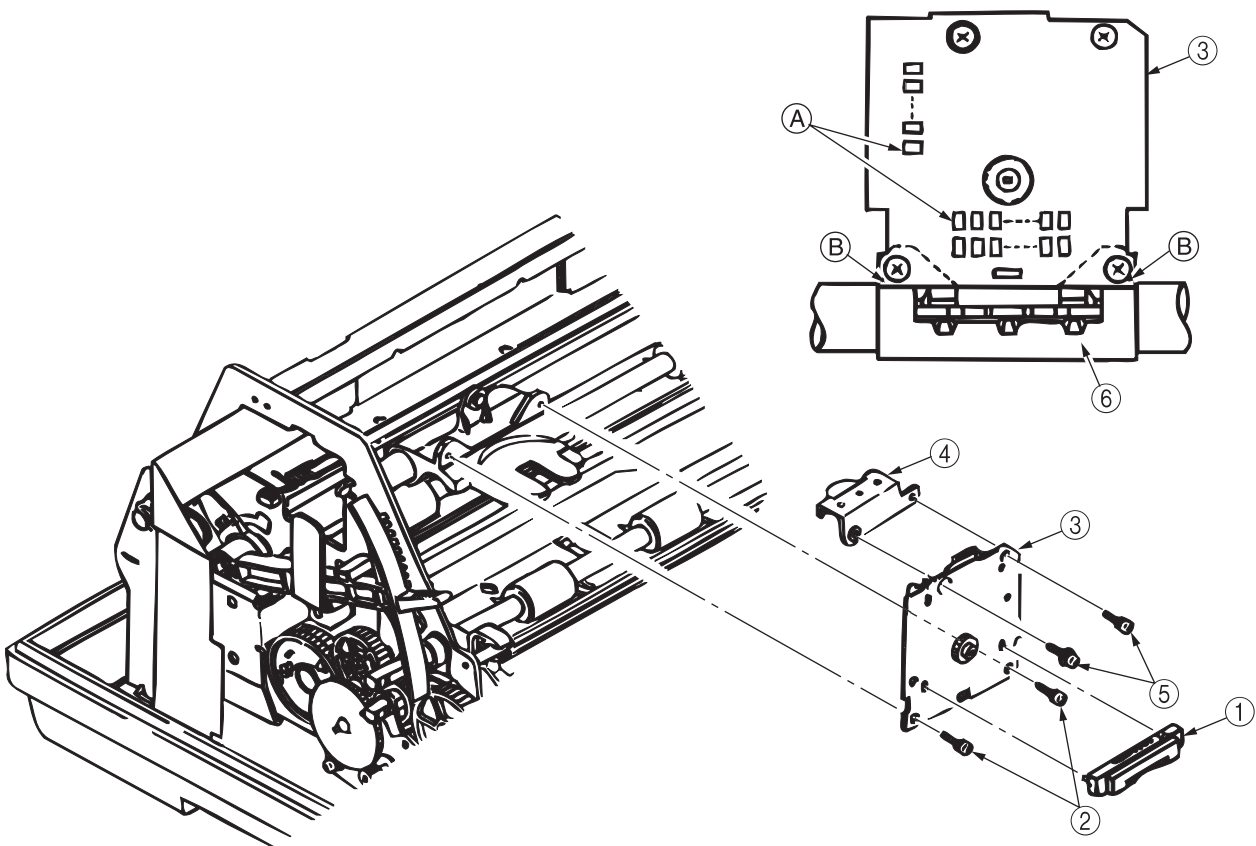


3.3.20 Space motor assembly

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the print head (see Section 3.3.18).
- (3) Remove the ribbon feed gear assembly (see Section 3.3.19).
- (4) Remove the connector ①.
- (5) Remove two screws ② to remove the space motor assembly ③ together with the guide roller assembly ④.
- (6) Remove two screws ⑤ to remove the guide roller assembly ④.

[Notes on reassembly]

- Do not touch the uncovered terminal (pressure welding point) ① of the space motor assembly ③. Also, do not allow any dust to come in contact with the uncovered terminal.
- When installing the space motor assembly ③, make sure that its part ② touches the carriage frame ⑥.
- After installing the space motor assembly, adjust the gap of the print head (see Section 4.1).

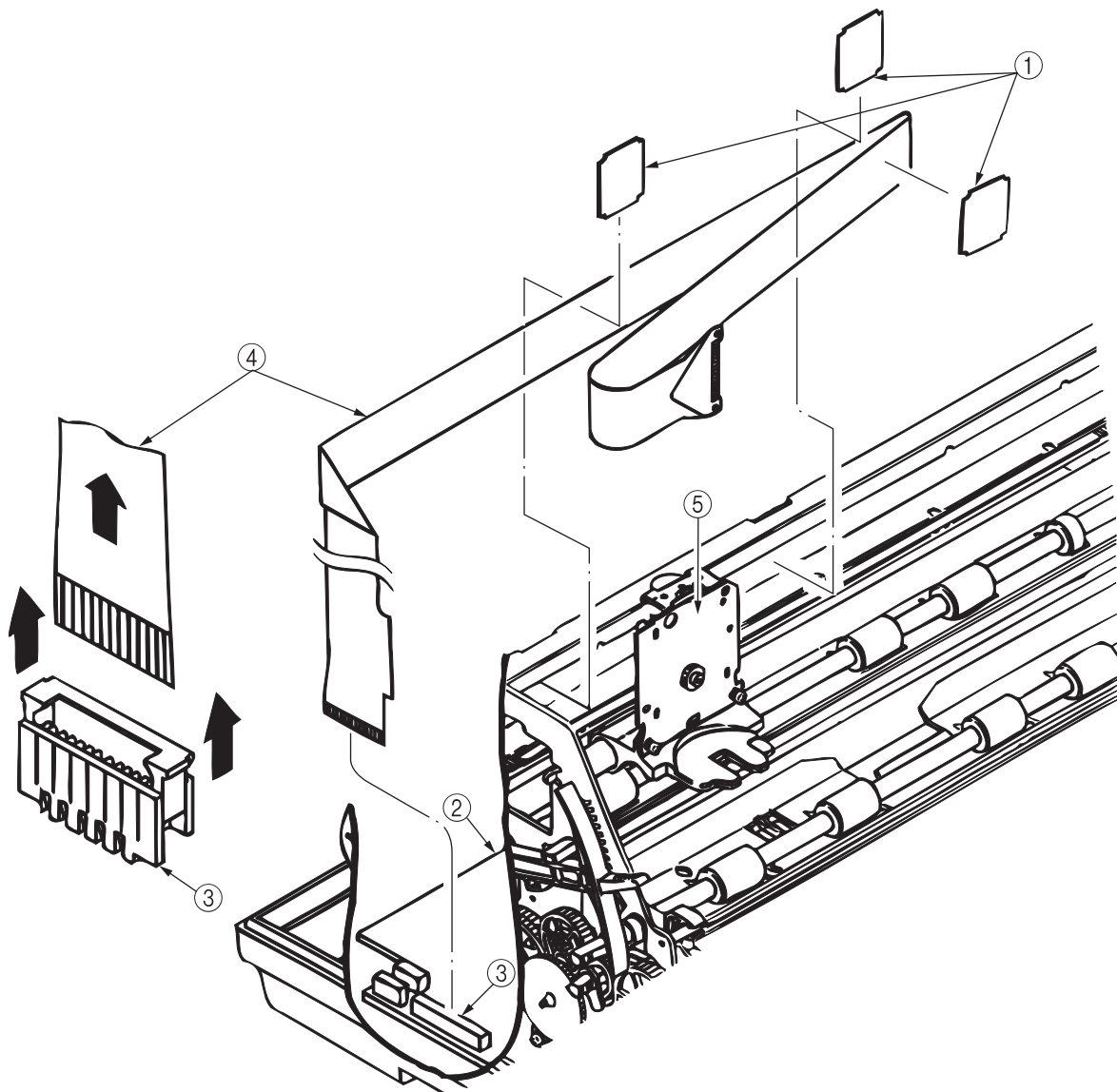


3.3.21 Head cable

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the ribbon feed gear assembly (see Section 3.3.19).
- (3) Remove three guide plates ①.
- (4) Unlock the connector (CN8) ③ of the Control board ② to remove the head cable ④.

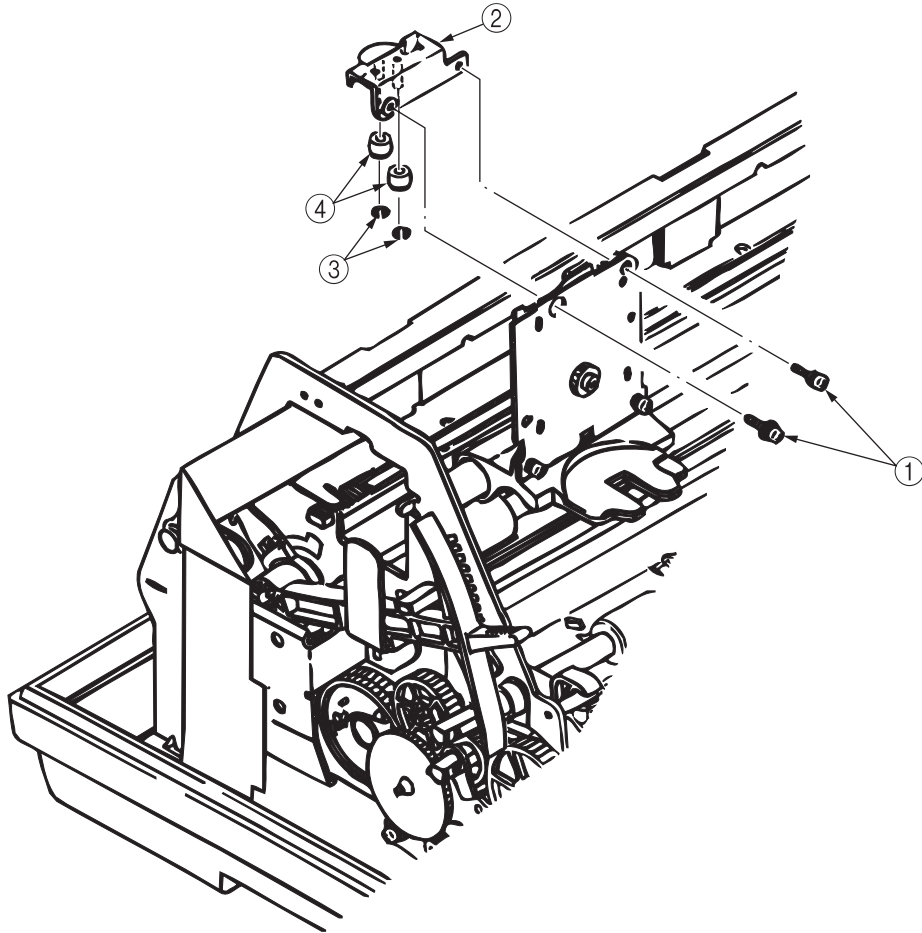
[Notes on reassembly]

- Do not touch the uncovered terminal (pressure welding point) of the head cable ④ and the space motor assembly ⑤. Also, do not allow any dust to come in contact with the head cable and the uncovered terminal.
- Handle the head cable ④ carefully so that no creases are made.



3.3.22 Guide roller

- (1) Remove the upper cover assembly (see Section 3.3.1).
- (2) Remove the ribbon feed gear assembly (see Section 3.3.19).
- (3) Remove two screws ① to remove the guide roller assembly ②.
- (4) Remove the E-clip ③ to remove the guide roller ④.



4. ADJUSTMENT

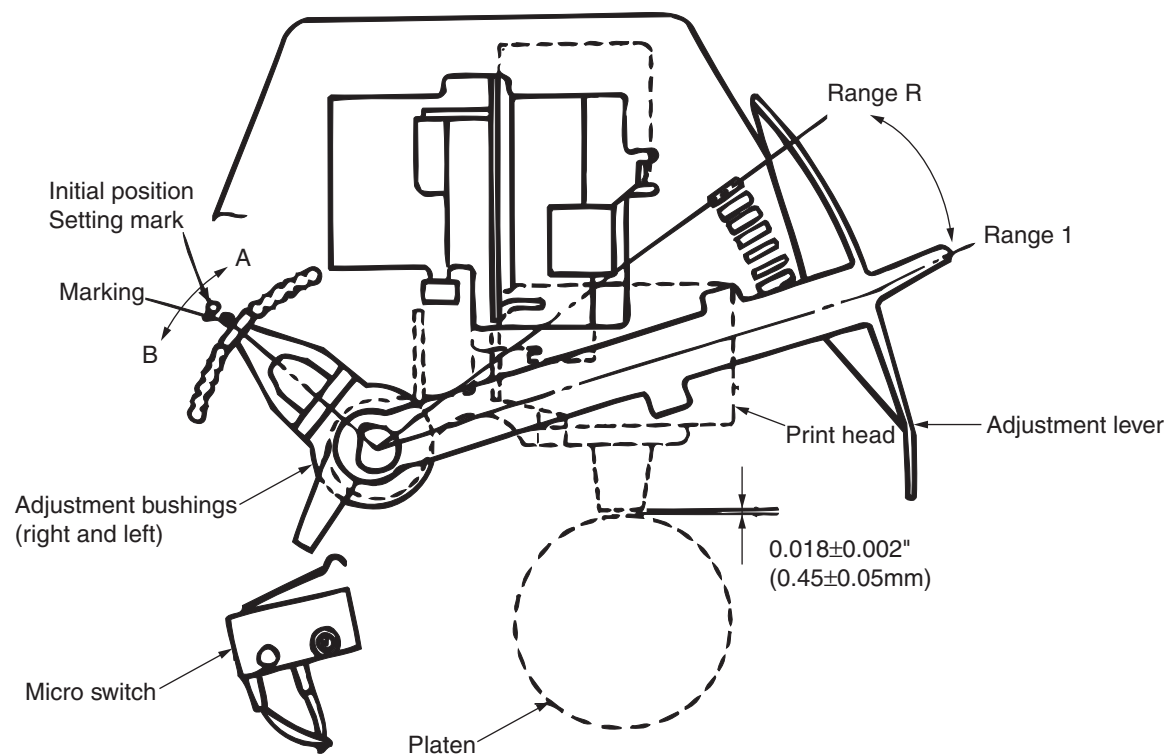
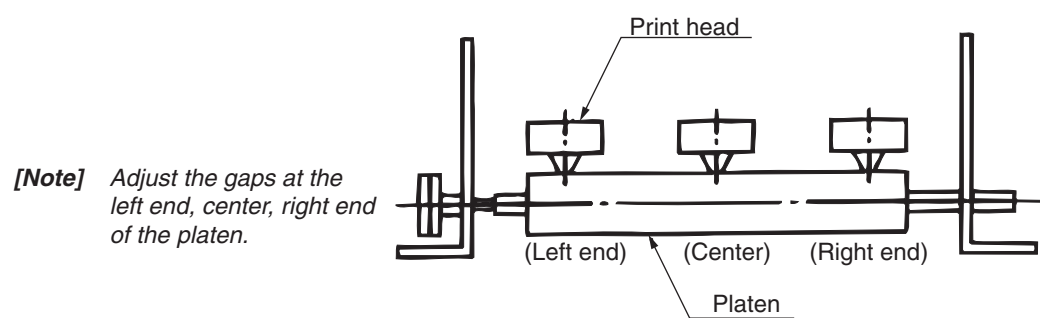
4.1 Gaps between Platen and Print Head

[Note] Set the adjustment lever to range 1 before checking adjustment.

- (1) Adjustment value : 0.018 ± 0.002 " (0.45 ± 0.05 mm)
- (2) Adjustment positions : The left end, center, and right end of the platen
- (3) Adjustment method : Rotate the left and right adjustment bushings.

[Adjustment procedure]

- a. Set the adjustment lever to range 1.
- b. Set the left and right adjustment bushings to the initial position (marking).
- c. Put the adjustment lever to the left side frame (make sure there is no play between the adjustment lever and the groove).
- d. while maintaining the condition described in C above, slide the adjustment bushings in the A or B direction.
- e. Confirm that the adjustment lever is set to range R and the gap is 0.033 ± 0.002 " (0.85 ± 0.05 mm).



4.2 Micro Switch Position

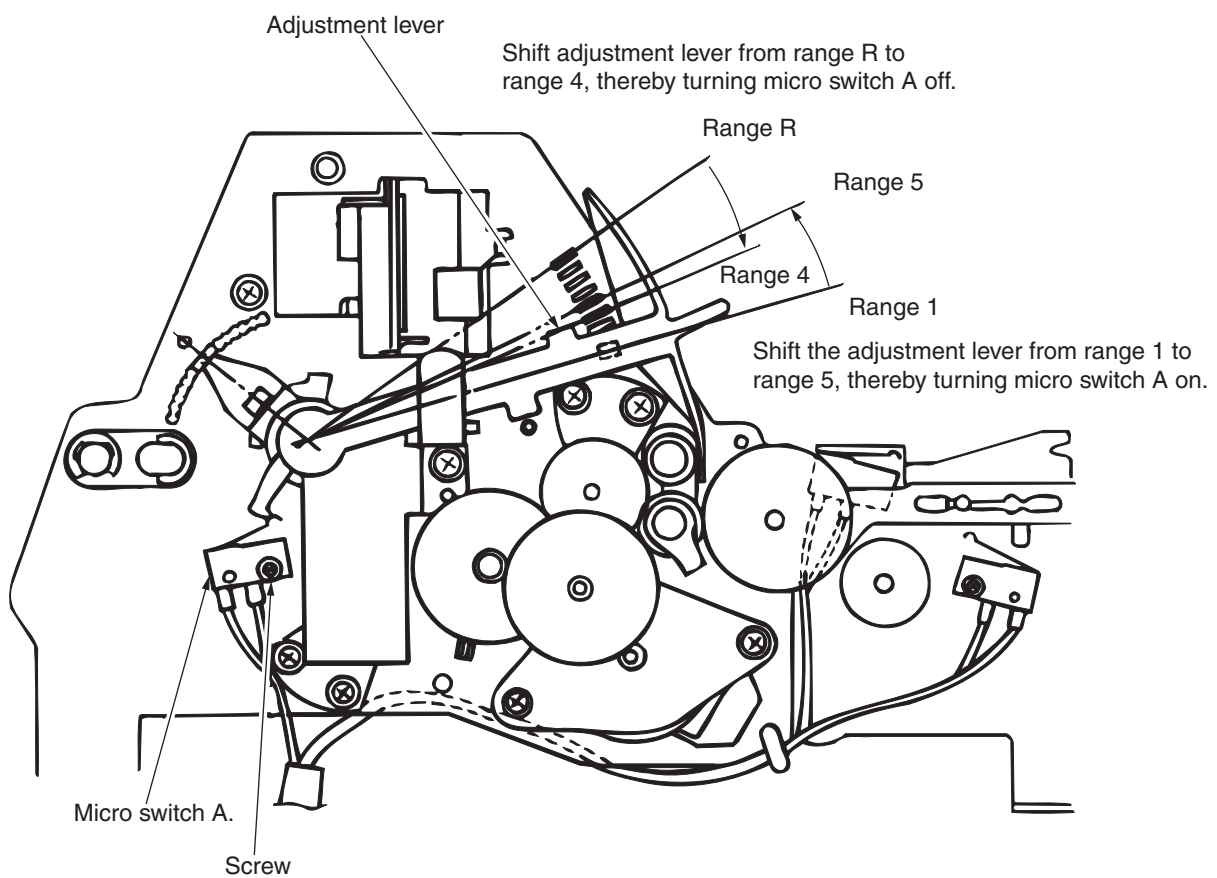
[Note] Micro switch A is to be adjusted.

(1) Adjustment value

- When the adjustment lever is shifted from range 1 to range 5, micro switch A is turned on.
- When the adjustment lever is shifted from range R to range 4, micro switch A is turned off.

(2) Adjustment method

position micro switch A by loosening the screw.



5. CLEANING AND LUBRICATION

5.1 Cleaning

[Notes for cleaning]

- Before attempting to clean the printer, turn the POWER switch off.
- Be careful so that no paper dust enter inside mechanical components.

[Area to be cleaned and cleaning period]

Follow the guidelines to clean the printer at the specified intervals.

- Cleaning period : Every six months or 300 operation hours, whichever comes first
- Required time : About ten minutes
- Tools to be used : Dry soft cloth (such as gauze, etc.) and vacuum cleaner (preferable)
- Cleaning area :

Table 5-1 Areas to be cleaned

Area to be cleaned	Contents of cleaning
Carriage shaft and its vicinity	Remove paper dust, and wipe off any dirt, dust, and ribbon fibers
Paper path	

5.2 Lubrication

(1) Lubricant

- Pan motor oil 10W-30 (or its equivalent) - PM
- Albania grease #2EP (or its equivalent) - GEP

(2) Amount of lubricant

- A lot - (A) - Plenty of lubricant
- Medium - (M) - About 3 to 4 drops. Alternatively, add a 0.008" (0.2 mm) layer of grease.
- Little - (L) - About one drop
- Very little - (VL) - No blot on the parts surface.

(3) Period of lubricant

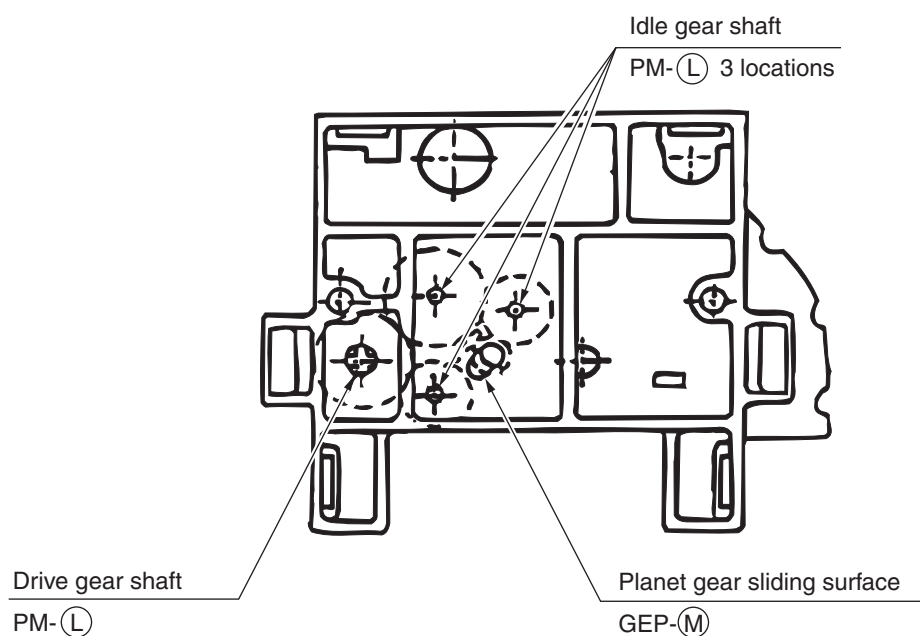
This equipment is designed to be maintenance-free and oiling is unnecessary during operation.

However, when reassembly or cleaning of oiled parts occurs, lubrication is required.

(4) Areas to avoid contact with lubricant.

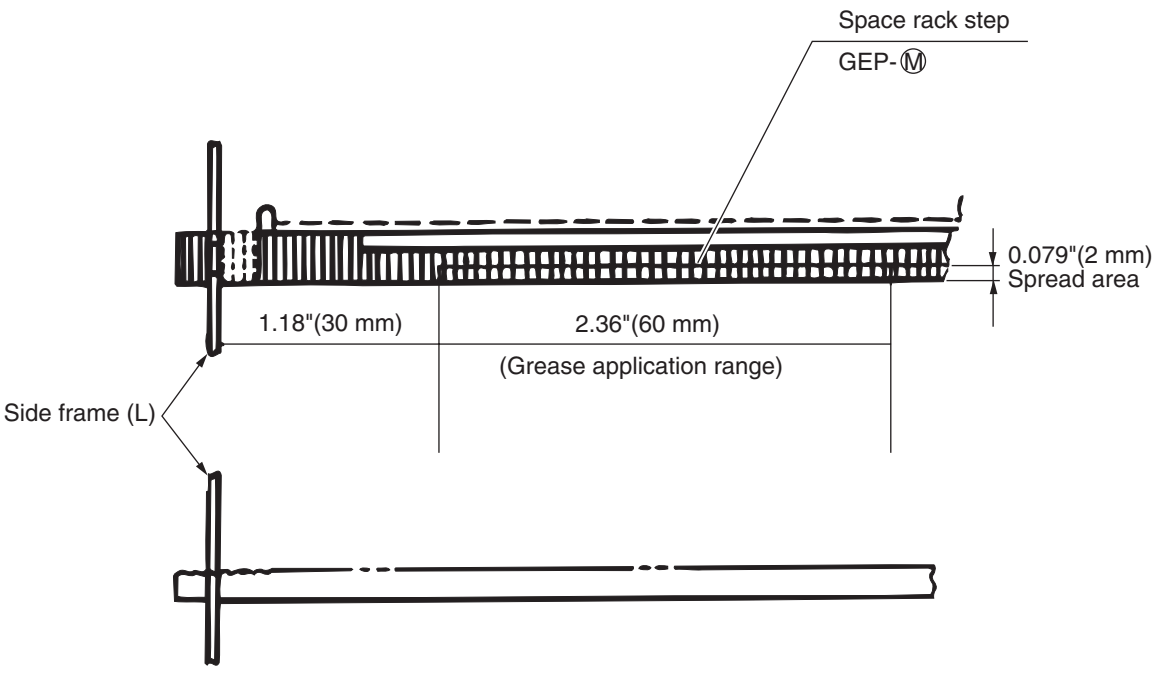
Item No.	Areas to avoid lubricant	Reason	Remarks
1	Ink ribbon	To prevent print characters from blurring	
2	Platen surface	To prevent paper from getting dirty	
3	Feed roller surface	To prevent paper from getting dirty	
4	Flexible cable	To prevent poor contact and cracks	
5	Motor board	To prevent poor contact	
6	Carriage shaft	To stabilize the load of carriage feeding	
7	Sensor	To prevent dust accumulation	
8	Micro switch	To prevent dust accumulation	
9	Stacker roller surface	To prevent paper from getting dirty	
10	Pin tractor	To prevent paper from getting dirty	
11	Print head	To prevent printhead failures	

- (5) Lubrication points
a) Ribbon drive gear assembly

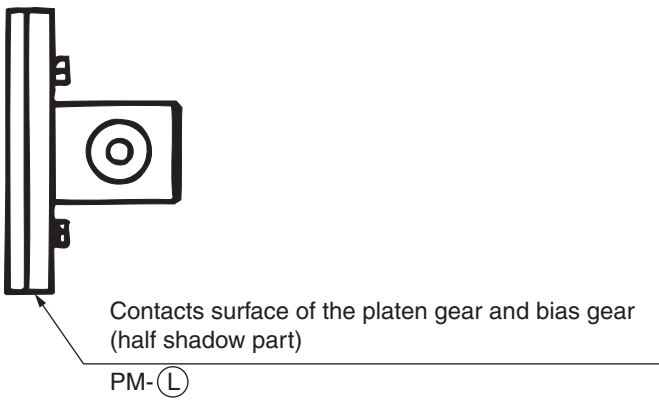


[Note] The upper and lower ends of the gear shaft should be oiled.

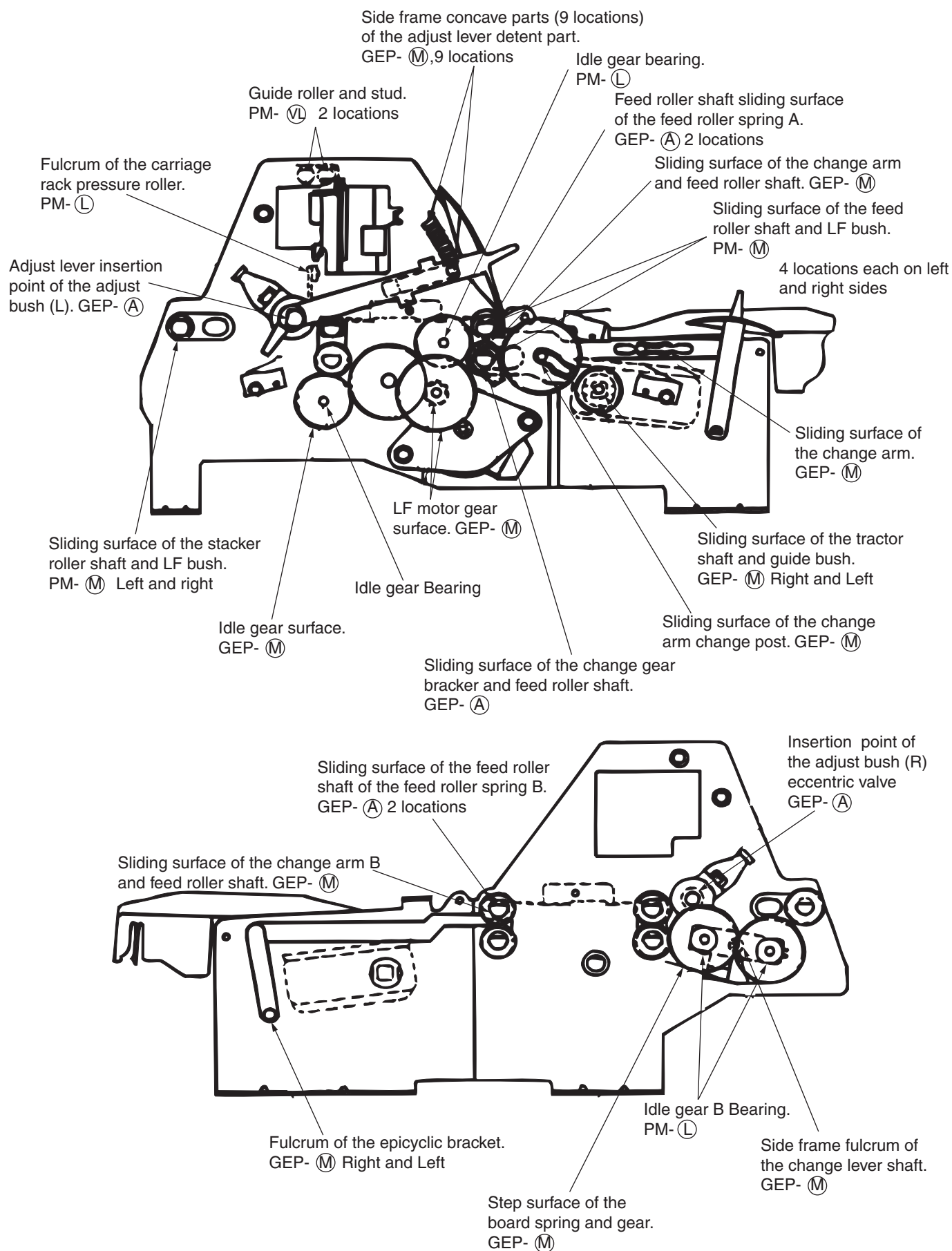
(b) Space rack



(c) Platen assembly



(d) Printer mechanism



6. TROUBLESHOOTING AND REPAIR

6.1 Items to Check before Repair

Before servicing the printer ask the customer, if possible, under what conditions the problem occurred, and record the customer's responses.

Before troubleshooting, set up the printer to operate under the same conditions as at the time the problem occurred and check whether the problem is reproducible. If the problem is not reproducible, perform the printer's self test and thoroughly test the printer's functions. If the problem is reproducible, proceed to the troubleshooting section.

6.2 Method of Troubleshooting

Verify the problem and then locate the problem in according to the detailed procedure given for each item in Table 6-1.

Before correcting the problem, thoroughly read the precautions in Section 3.1.

The checkpoints for the Control board and Operation board are shown in Figure 6-1, 6-2. The connector locations and pin numbers are shown in Figure 6-3.

Table 6-1

Status	Details	Flowchart item No.
Problems at power on	• Power is not supplied.	①
	• Spacing operation is not performed normally.	②
Problems during printing operation	• Wrong character, character or dot omission.	③
	• Line feed problem.	④
	• Malfunction of switches of operation panel.	⑤
	• Data receiving failure.	⑥

6.3 Lamp Display

- (1) Printer mode display
- (2) Fault alarm display

When the printer detects a variety of alarm conditions, these alarm conditions are displayed by LEDs. Alarm conditions status is displayed by various MODE LEDs, which are lit along with the POW LED and the flashing ALM LED.

The details are listed below:

Table 6-2

Printer mode		ALARM LED	SELECT LED	EJECT DIRECTION LED	Contents	Remarks
Normal operation mode	ON LINE	OFF	ON	Don't care	Indicates that the printer is ready to receive data and print.	
	HEX DUMP mode				Indicates that the printer is in hex dump mode.	
	LOCAL mode	OFF	OFF	Don't care	Indicates that the printer is in the local mode.	
	MENU mode	OFF	OFF	Don't care	Indicates that the printer is in the menu mode.	
Operator alarm condition	Paper end	ON	OFF	Don't care	Form end, single sheet end, or bottom paper end	
	Paper jam				SASF paper jam	
	CSF paper jam				Paper jam or paper end, when CSF is installed	
	Print suppress	OFF	BLINK	Don't care	Indicates that the printer is in the print suppress mode.	
	CSF detach alarm	ON	OFF	BLINK	Indicates that the printer is in the CSF detach alarm mode.	
	Continuous -to- cut-sheet switching alarm				Indicates that the printer is in the continuous-to-custsheet switching alarm mode.	
Internal fault alarm condition		BLINK	OFF	Don't care		

Table 6-3

Error condition	Lit mode LED besides POW and flashing ALM LED	Contents
Memory error	10	CPU internal RAM error
	12	Program ROM error
	UTL	EEPROM error
	12, PROP	External RAM error
	HSD	CGROM error
	QUIET	Program error
	PROP	Serial I/F board error
Spacing error	20	Spacing error

*PROP : PROPORTIONAL

Table 6-4

Alarm	LEDs				Comment
	Primary Message			Detail Message	
	Menu	ALARM	SEL		
Paper out	Current mode	ON	OFF	Current CPI	alarm occurs 1/6" (4.35mm) from bottom edge
Print head Temp	BLINK	OFF	ON	Current CPI	after cool down, continues to print

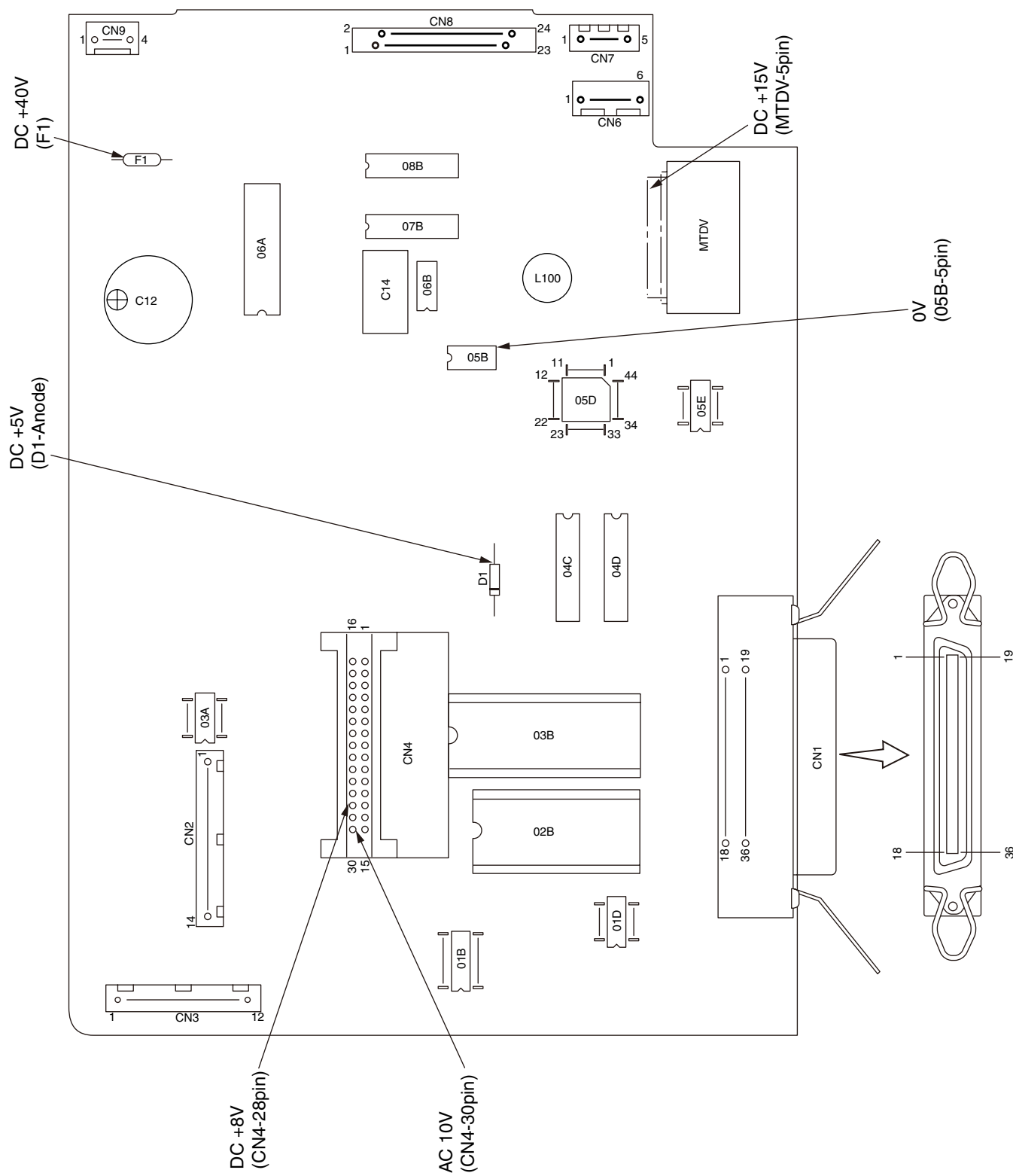


Figure 6-1 Check points on the Control board

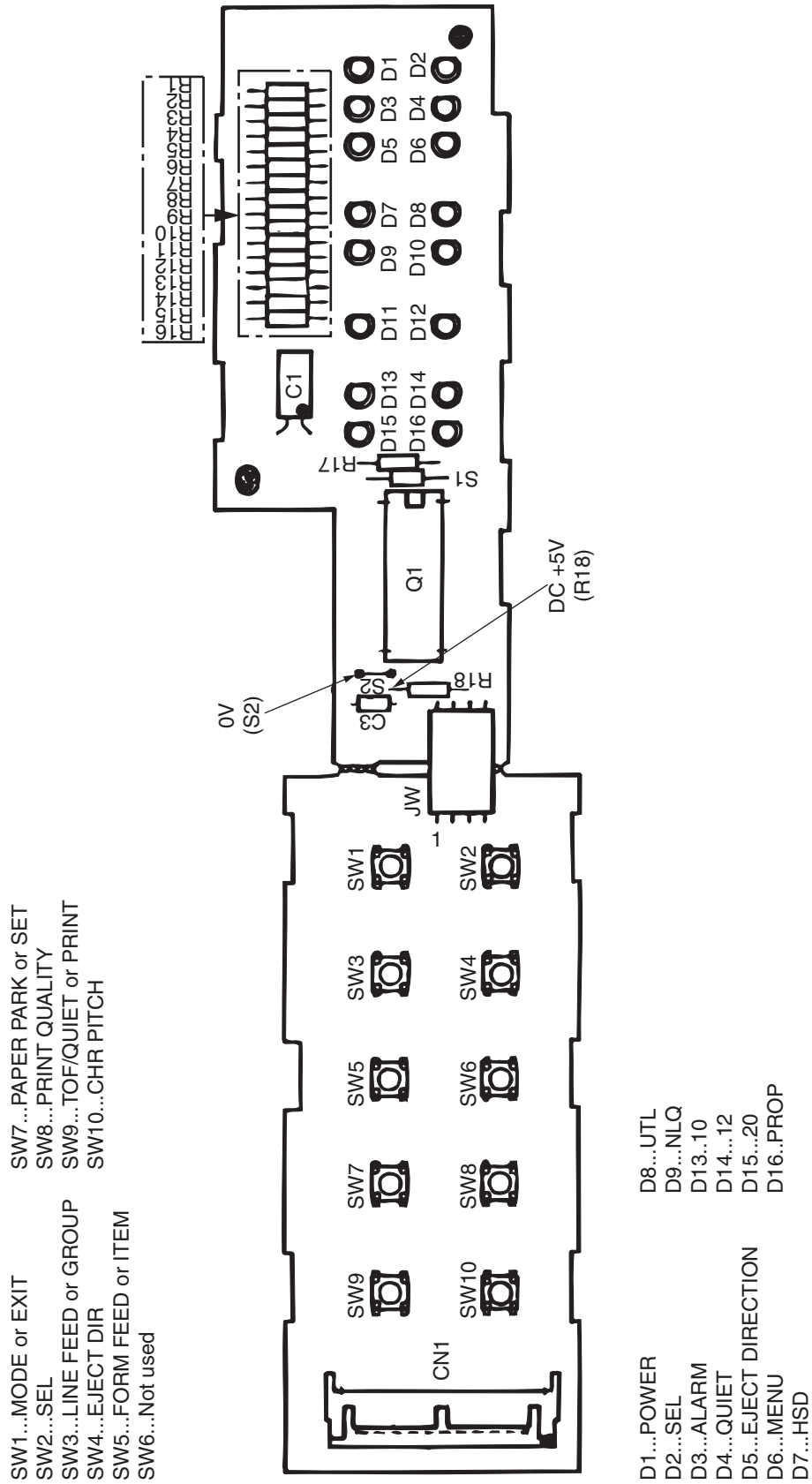


Figure 6-2 Check points on the Operation board

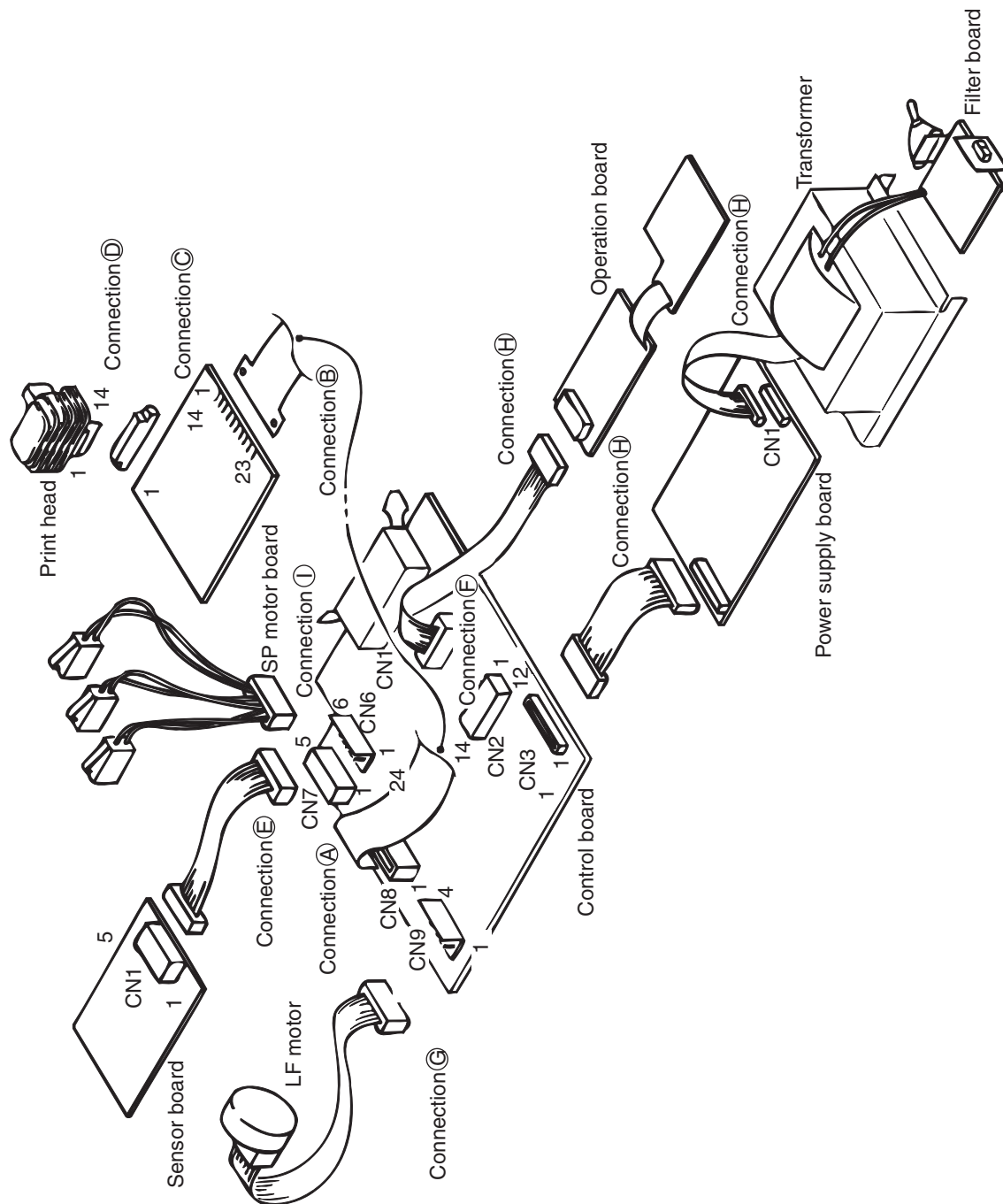


Figure 6-3 Connection locations and pin numbers

Table 6-5 Pin numbers and signal names (1/2)

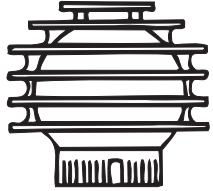
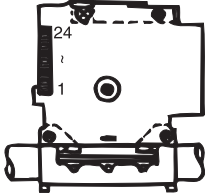
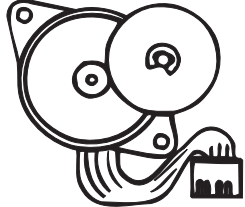
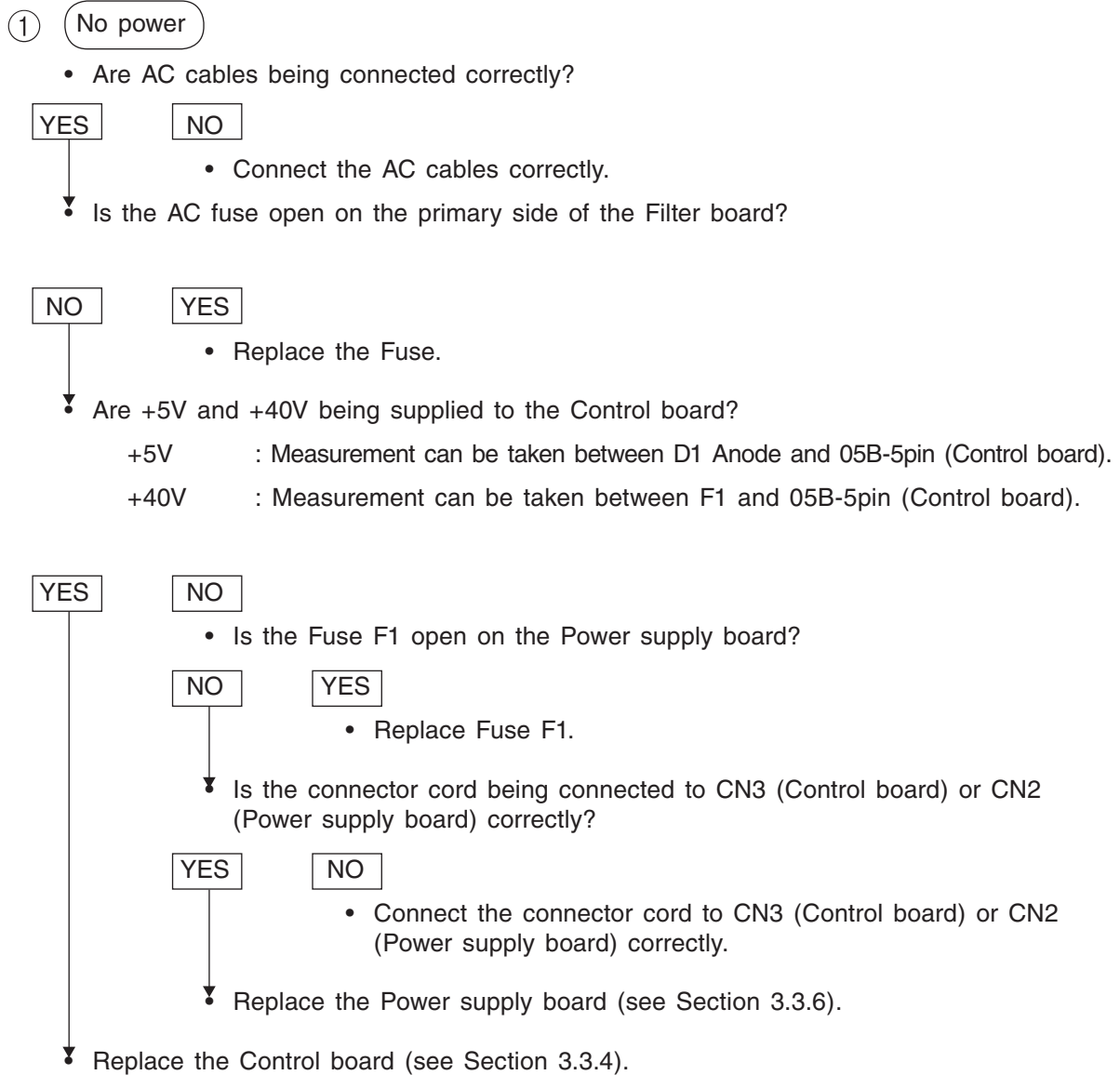
Name	Signal Name	Connection						Coil Resistance	Figure
		A	B	C	D	G	H		
PRINT HEAD	GAP	3	2					Approx. 18.8Ω	Pins on print head Back of print head  1 - 14
	TMP	10	9	7	7				
	+40V	8,9	7,8	8-10	8-10				
	+5V	20	19						
	SG	11,21	10,20	6	6				
	#1	16	15	1	1				
	#2	15	14	2	2				
	#3	4	3	14	14				
	#4	14	13	3	3				
	#5	5	4	13	13				
	#6	13	12	4	4				
	#7	6	5	12	12				
	#8	12	11	5	5				
	#9	7	6	11	11				
SP MOTOR	U	18	17					Approx. 21Ω	Pins on SP motor 
	V	17	16						
	W	19	18						
	φ A	23	22						
	φ B	22	21						
LF MOTOR	φ 1					2		Approx. 8.7Ω	Contacts on the LF motor 
						1			
	φ 2					3			
						4			
POWER	+40V						1-3		
	EP						4,5		
	+5V						6,7		
	0V						8,9		
	+8V						10		
	AC 10V						11		
	ALM						12		

Table 6-5 Pin numbers and signal names (2/2)

Name	Signal Name	Connection								Coil Resistance	Figure
						F	E	I			
OPERATOR PANEL	SEL SW					9					
	MODE SW					5					
	LF SW					1					
	FF SW					2					
	PARK SW					3					
	TOF SW					4					
	PRINT SW					11					
	CHAR SW					10					
	LED DATA					7					
	LED CLK					8					
	+5V					6					
	0V					14					
	ED SW					13					
	-					12					
Sensor PCB	PAPER END						2				
	TABLE SENSE						1				
	0V						4,5				
	+5V						3				
Micro Switch Assy	CSF CONNECT							2			
	HEADGAP							6			
	CUTSHEET							4			
	0V							1,3,5			



② Space operation does not operate normally

- Is the carriage assembly moving erratically or jammed?

NO

YES

- Check around the carriage assembly and Space motor and repair the mechanism.

- Are +5V and +40V being supplied to the Control board?

YES

NO

- Is the connector cord being connected to CN3 (Control board) or CN2 (Power supply board) correctly?

NO

YES

- Replace the Power supply board (see Section 3.3.6).

- Connect the connector cord to CN3 (Control board) or CN2 (Power supply board) correctly.

- Is CN8 contact connection normal?

YES

NO

- Connect the head cable to CN2 correctly.

- Replace the Control board (see Section 3.3.4).

- Has the condition been corrected?

YES

NO

- Replace the Space motor (see Section 3.3.20).

- END

③ Wrong character, character or dot omission

- Is the head cable being inserted into CN8 of the Control board correctly?

YES

NO

- Reset the head cable to CN8 correctly.

- Replace the Print head (see Section 3.3.18).

- Is condition corrected?

YES

NO

- Replace the Control board (see Section 3.3.4).
- Has the condition been corrected?

NO

YES

- END

- Is the Space motor board contact normal?

YES

NO

- Reset the head cable.

- Replace the Space motor (see Section 3.3.20).

END

④ Line feed trouble

- Rotate the platen knob. Does the platen rotate smoothly?

YES

NO

- Switch the paper release lever to the continuous forms or cut-sheet. Does the platen rotate smoothly?

YES

NO

- Reinstall paper
- Make sure that no foreign matter or dust is present on the platen gear, idler gear or drive gear.
- Ensure smooth meshing of the platen gear, idler gear and drive gear.
- Ensure correct operation of the push tractor assembly (R) or (L).
- Replace the push tractor assembly (R) or (L).

- Is LF motor cable connected being with Control board correctly?

YES

NO

- Connect it correctly.

- Replace the Control board (see Section 3.3.4).

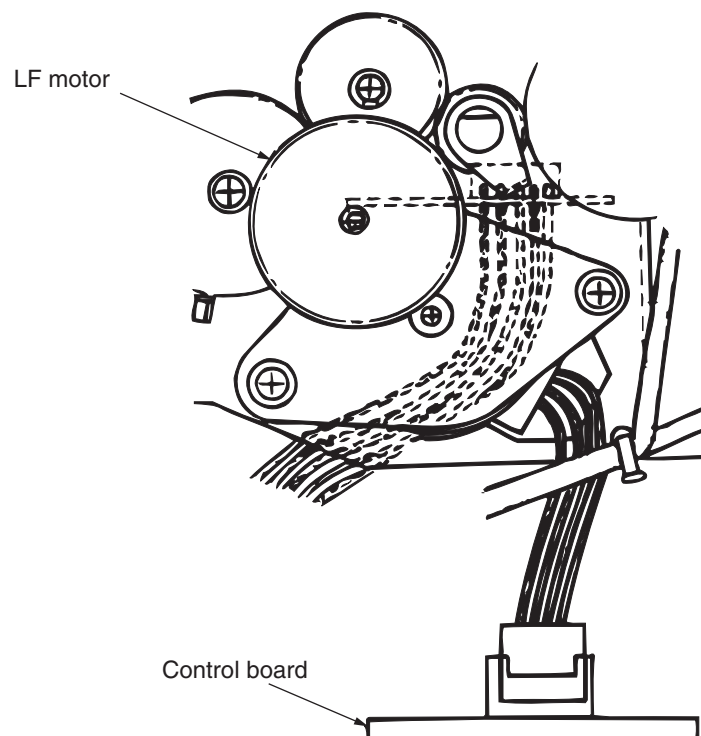
- Remedied?

YES

NO

- Replace the LF motor (See Section 3.3.9).

END



⑤ Malfunction of switch on operation board

- Is the Operation board being inserted into CN2 correctly?

YES

NO

- Connect it correctly.

▼ Replace the Operation board (see Section 3.3.13). Has the condition been corrected?

YES

NO

- Replace the Control board (see Section 3.3.4).

▼ END

⑥ Data receiving failure

- Is the SELECT lamp on?

YES

NO

- Set to SELECT mode.

▼ Is the interface cable being connected correctly?

YES

NO

- Connect it correctly.

▼ Replace the Control board (see Section 3.3.4).

APPENDIX A PCB LAYOUT

- (1) Control board
- (2) Operation board
- (3) Sensor board

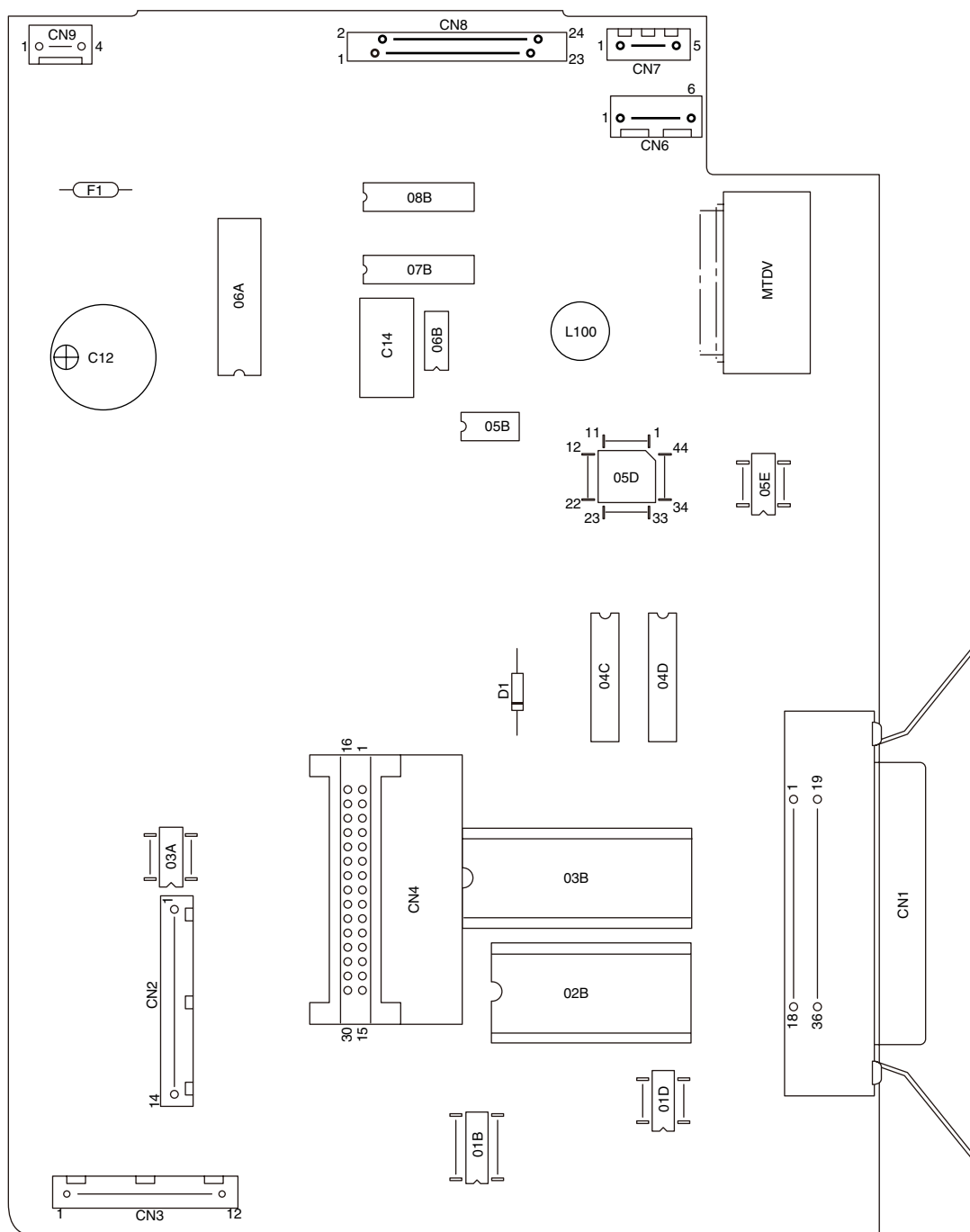


Figure A-1 Control board

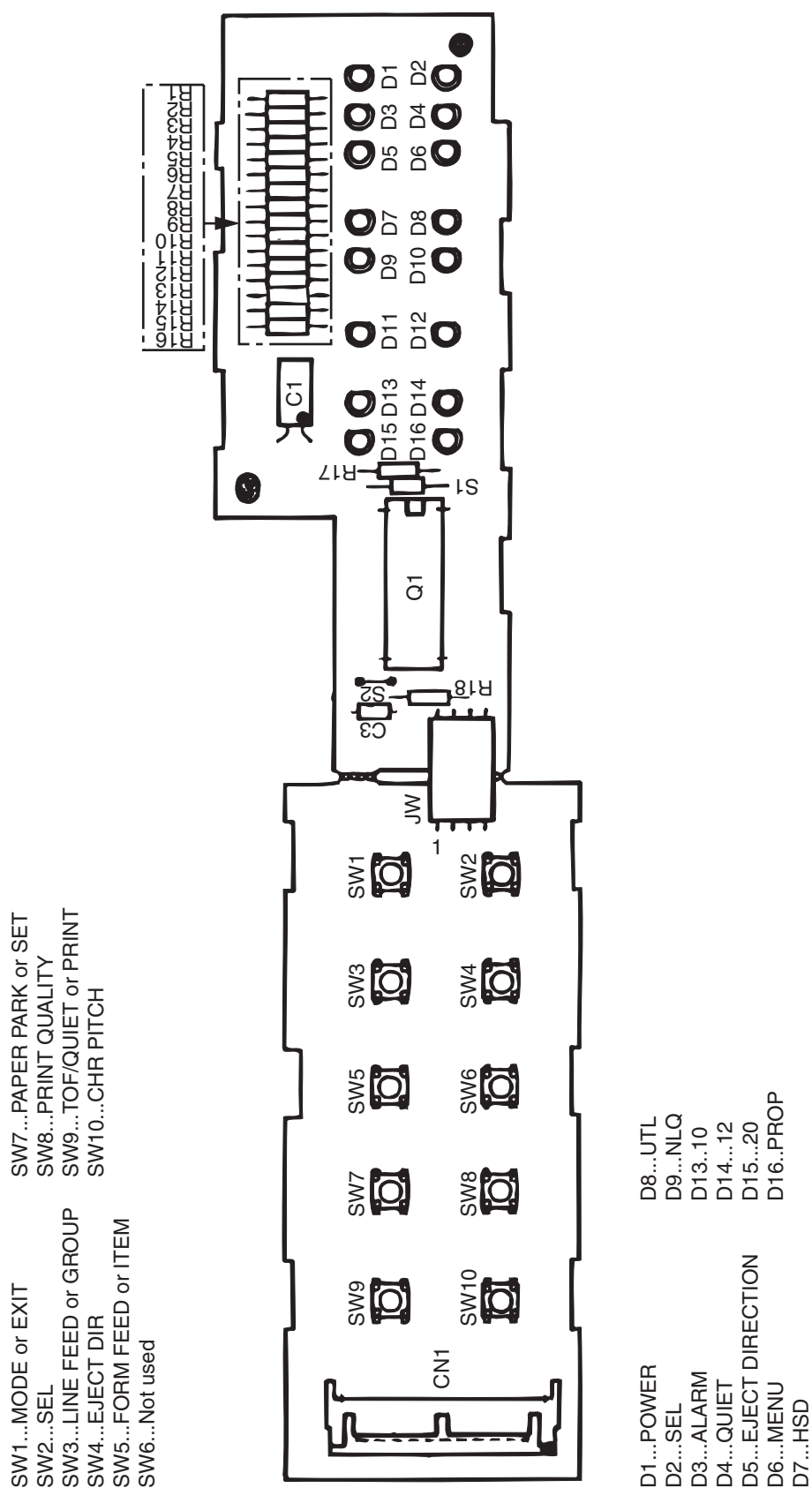


Figure A-2 Operation board

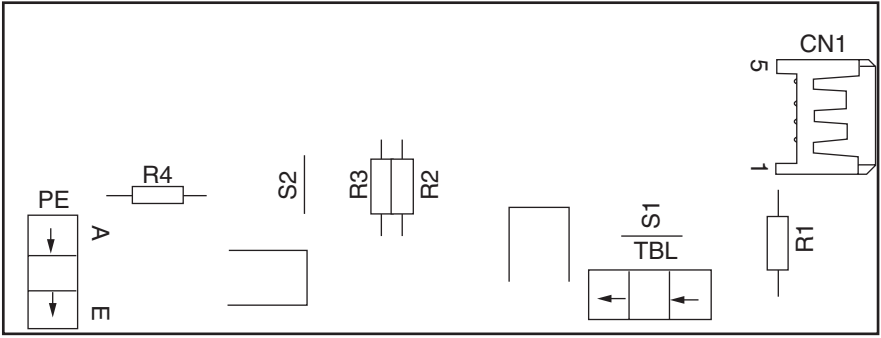


Figure A-3 Sensor board

APPENDIX B RS-232C SERIAL INTERFACE BOARD (OPTION)

1. GENERAL

This section describes the operation of the RS-232C Serial Interface board installed in the Printer as an option using a start-stop synchronization and serial communications circuit. This serial interface board is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: Printer Ready/Busy and X-ON/X-OFF modes.

2. OPERATION DESCRIPTION

2.1 Element Description

- (1) 80C51 with MASK ROM

An eight-bit microprocessor controller that controls the following:

- (a.) Serial interface protocol and data transfer through a serial port.
- (b.) Message buffer.
- (c.) Transmission of parallel data to the printer.

- (2) SN75189

An RS-232C standard line receiver.

- (3) SN75188

An RS-232C standard line driver.

- (4) 2764

An 8 kbyte ROM that contains the serial interface control program.

- (5) HM6264

An 8192-byte static RAM used as a message buffer.

2.2 Circuit Description

A block diagram is shown in Figure B-2-1.

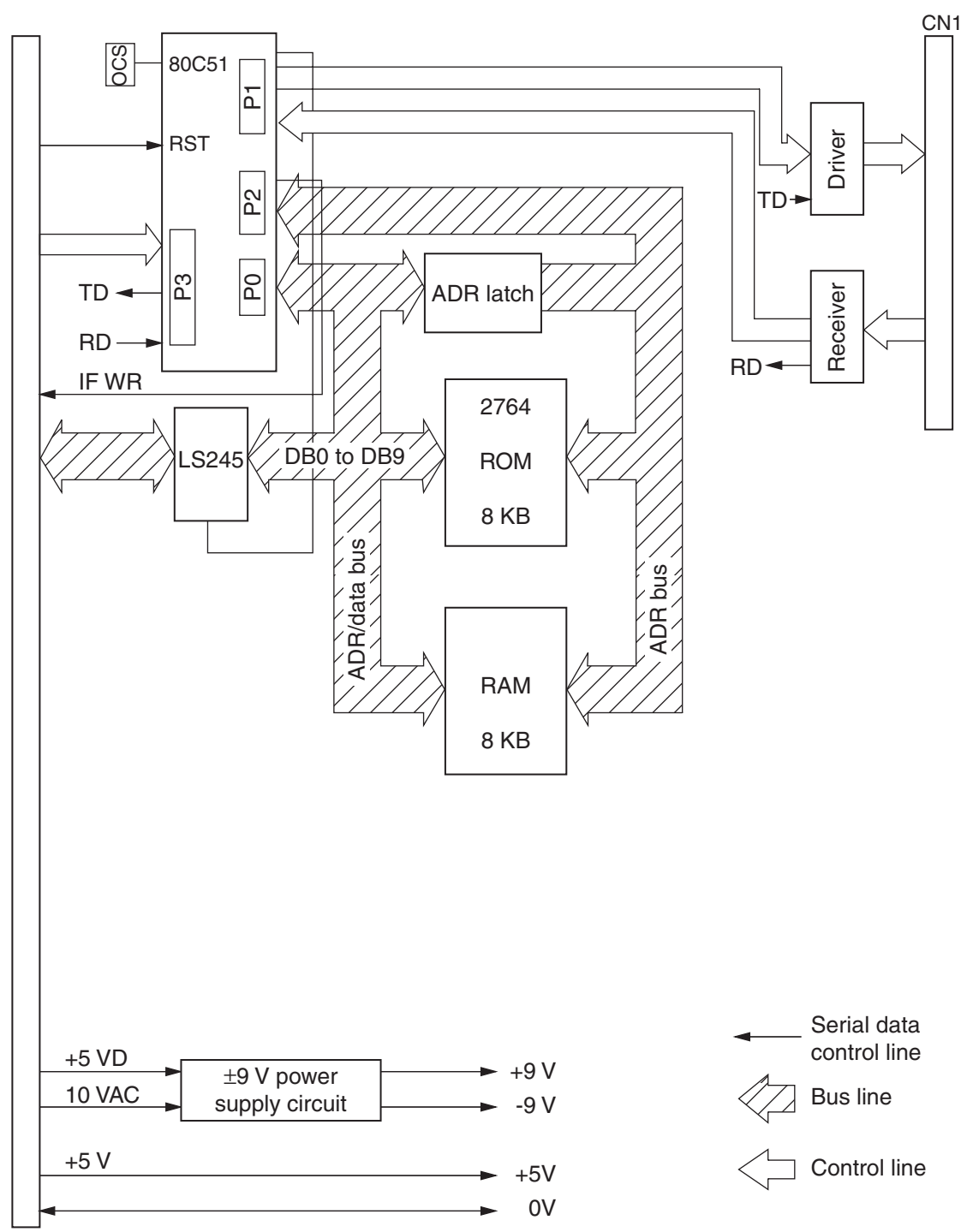


Figure B-2-1 Block Diagram

2.2.1 Operation at power on

After power is turned on, an RST OUT signal is sent from the printer control board to reset the printer. When the reset is canceled, the 80C51 CPU performs initialization. Initialization consists of setting the 80C51 timer, and setting the serial mode.

2.2.2 RS-232C interface

The DTR, SSD, TD and RTS signals output by the 80C51 are converted to RS-232C signals by line driver SN75188 and sent to the interface.

In addition, signals DSR, CTS, CD, and RD on the RS232C interface are converted to TTL level by line receiver SN75189 and input to the 80C51.

2.3 Communication Procedure Flowchart

2.3.1 Mode ①

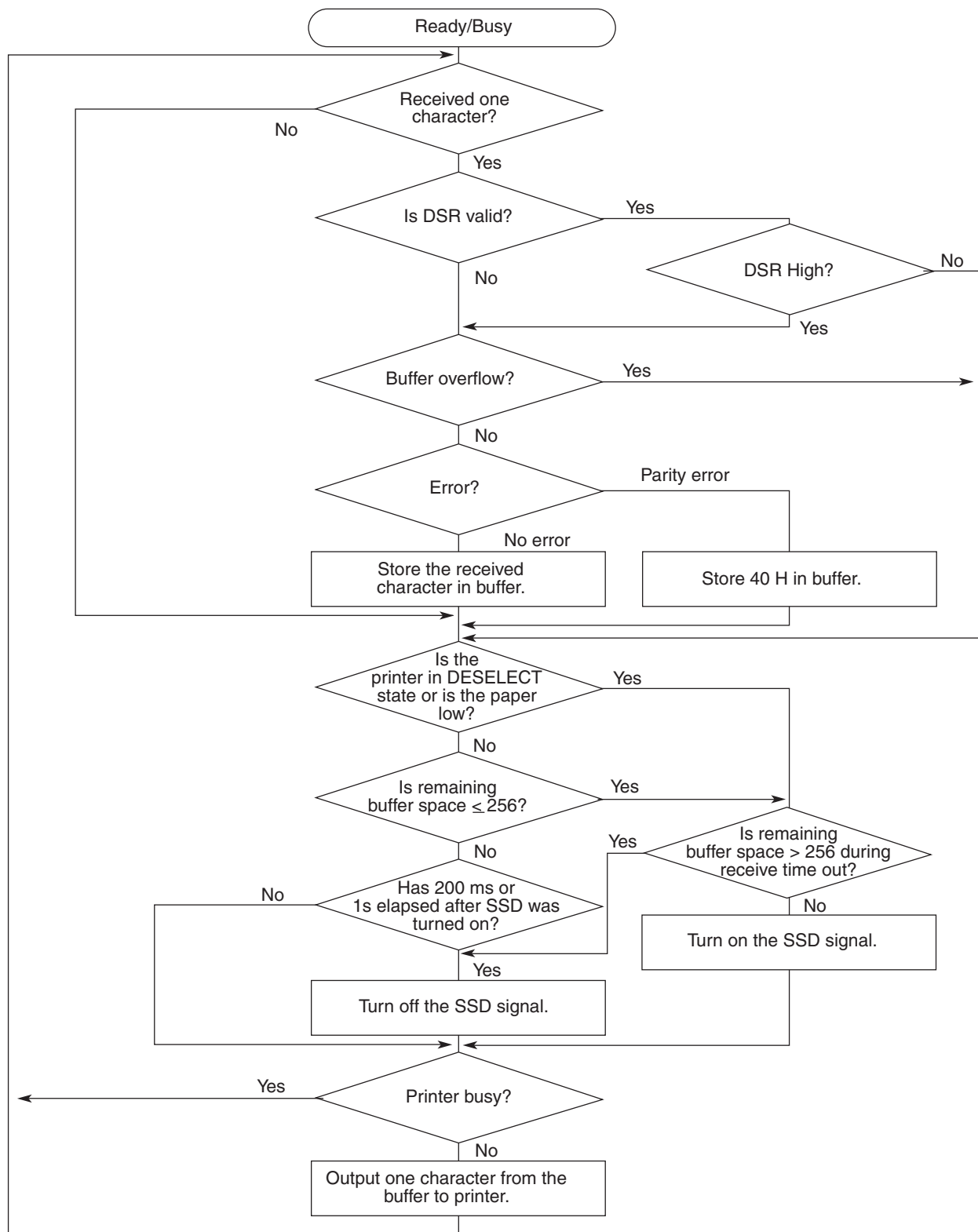


Figure B-2-2

2.3.2 Mode ②

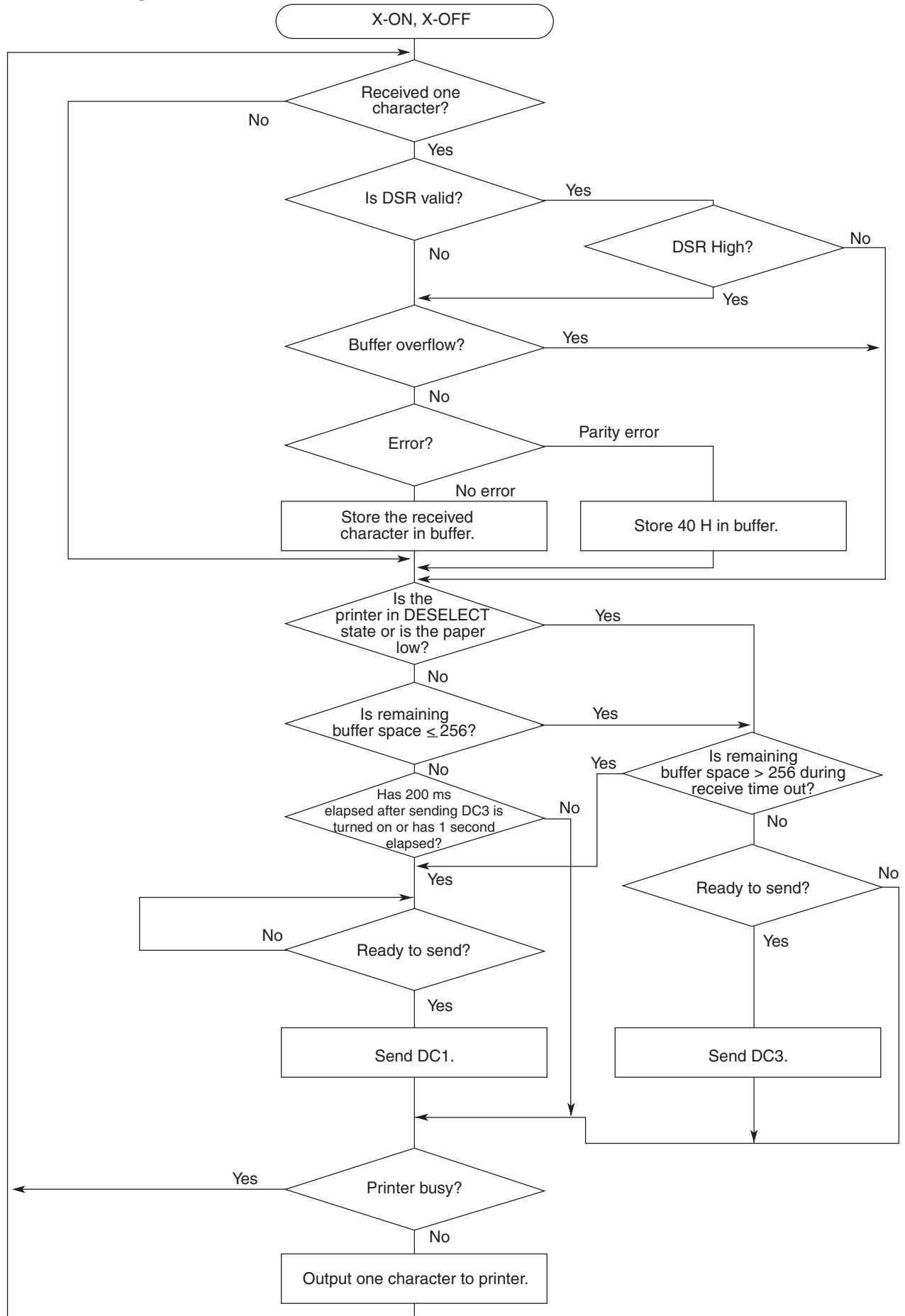


Figure B-2-3

3. TROUBLESHOOTING FLOWCHART

3.1 Before Repairing a Fault

Before servicing the printer, ask the customer in what situation the trouble occurred and record the response.

Before starting troubleshooting, operate the printer in the same situation as that at the time of trouble occurrence to see if the same trouble occurs again. If not, perform the printers self test and thoroughly test the printers functionality. If the trouble is reproducible proceed to the troubleshooting section.

3.2 Troubleshooting

- (1) The data is not received using a serial interface.
 - (2) Using a serial interface, the print data is omitted or the print operation is not performed.
- ① The data is not received using a serial interface.

(A protocol is set to READY/BUSY state, BUSY LINE is in SSD + state.)

- Is the OSC oscillation waveform as specified in Figure B-3-1?

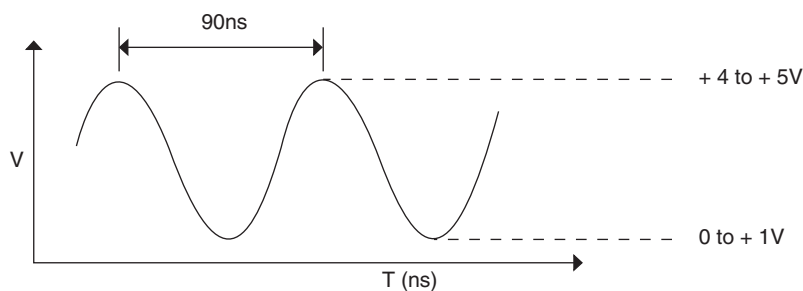


Figure B-3-1

- No Replace the OSC.

- Yes Is a RST signal in Q3 is as specified in Figure B-3-2?

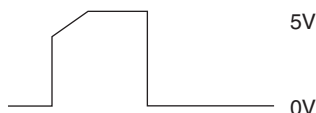


Figure B-3-2

- No Check the RST circuit on the Control board.

Ⓐ

Ⓐ

• Yes Are ALE, $\overline{\text{PSEN}}$, $\overline{\text{RD}}$, $\overline{\text{WR}}$, signals as specified in Figure B-3-3?

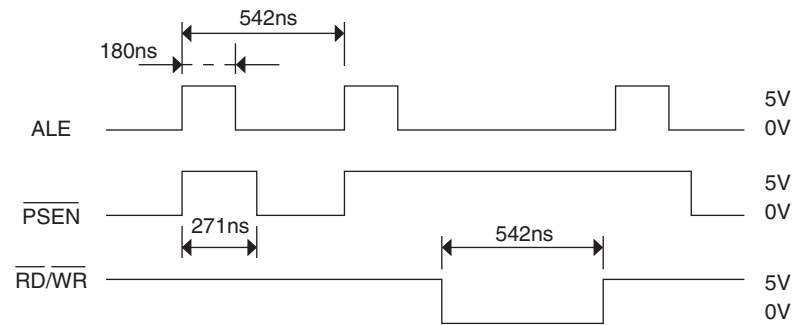


Figure B-3-3

- No Replace the Q3.
- ▼
- Yes Are (T1) $\overline{\text{SELECT}}$ and (INT0) $\overline{\text{BUSY}}$ signals low level?
- No Check 04B on the Control board.
- ▼
- Yes Are +9V and -9V input to Q1?
- No Replace defective component in +9/-9 volt Control board.
- ▼
- Yes Is pin 1 SSD signal of Q3 High level?
- No Replace the Q3.
- ▼
- Yes Is pin 11 SSD of Q1 low level?
- No Replace the Q1 or the CN1?
- ▼
- Yes Is the RxD of Q3 as specified in Figure B-3-4?

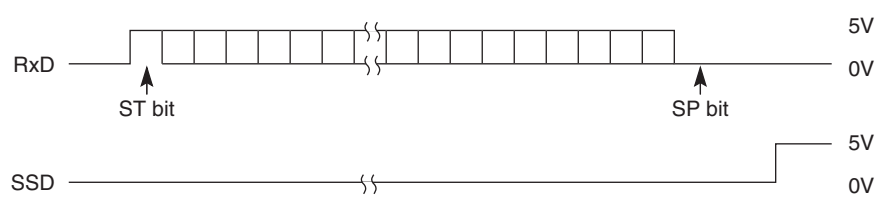


Figure B-3-4

- No Replace the Q2.
- ▼
- Yes Replace the Q3.

- ② In receiving by serial interface, printing data is omitted or printing operation is not performed.

• Are RxD and SSD of Q3 as specified in Figure B-3-4?

- No Replace the Q2.

• Yes Are \overline{WR} , and BUS signals of Q3 pin 3 as specified in Figure B-3-5?

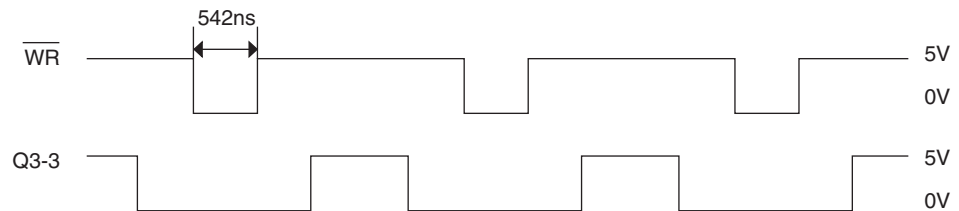


Figure B-3-5

- No Replace the Q3.

• Yes Is the level of a BUS signals at Q7 pins 2-9 the same as that of DB0-7 when \overline{WR} signal is started?

- No Replace the Q7.

• Yes Is 4 pin of Q6 identical to \overline{WR} signal in Figure B-3-5?

- No Replace the Q6.

• Yes Check 04B on the Control board.

3.3 Local Test

3.3.1 Circuit test mode

3.3.1.1 Setting

- (1) Diagnostic test (set by menu)
- (2) Test connector

Connect the test connector shown in Figure B-3-6 to the interface connector.

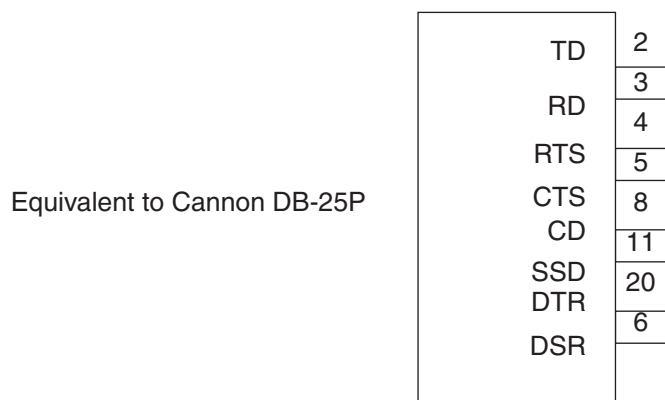


Figure B-3-6 Test Connector Connection Diagram

3.3.1.2 Function

After the settings outlined in Section 3.3.1.1 are completed and power is turned on, the serial interface checks the message buffer memory and interface driver/receiver circuits. It then prints characters.

To start and stop this test, push the SEL switch on the front of the printer.

Details of this test are explained on the following.

- (1) The program revision using two numerical characters is printed.
- (2) "LOOP TEST" is printed.
- (3) Memory is checked for the message buffer.
- (4) Prints "OK" is printed if the memory check is OK and "BAD" is printed if the memory check fails.
- (5) Output level to DTR, RTS, and SSD signals is dropped low. If DSR, CTS, or CD signals is High, "IF BAD" is printed. If DSR, CTS, and CD signals are all Low, "IF OK" is printed.
- (6) Output level to DTR, RTS, and SSD signals is raised high. If DSR, CTS, or CD signals is Low, "IF BAD" is printed. If DSR, CTS, and CD signals are all High, "IF OK" is printed.
- (7) Transmits characters codes from 20H to 7FH is transmitted by SD signal. At the same time, characters are received by the RD signal and stored in the message buffer.
- (8) The characters that were stored in the message buffer as indicated in (7) are printed.
- (9) Steps (1) through (8) are repeated until test is interrupted.